DECEMBER, 1937
Vol. I. No. 7

ONE SHILLING
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Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials

■ *Synthetic Resins* ■ *Casein* ■ *Rubber* ■ *Cellulose Compositions* ■

Ernest Elwood
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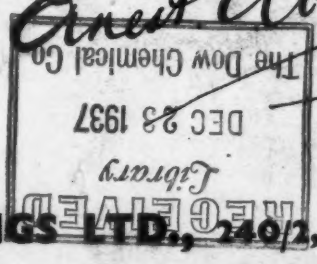

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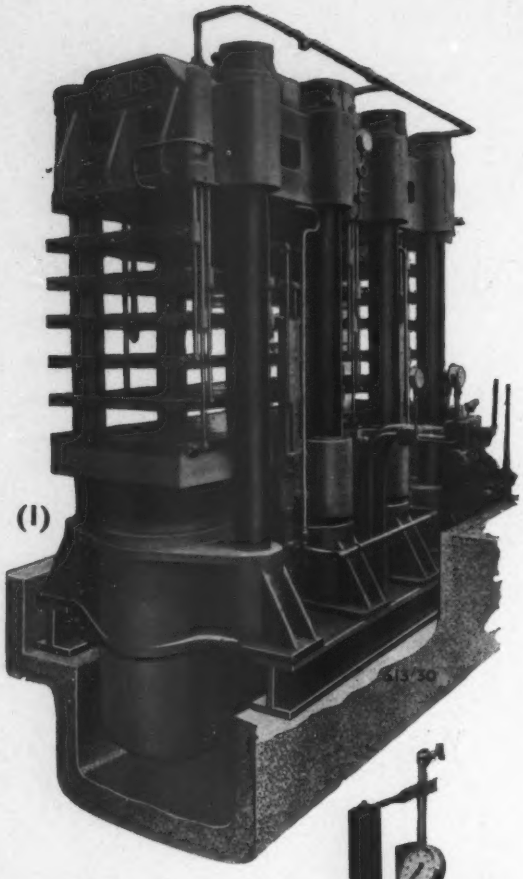

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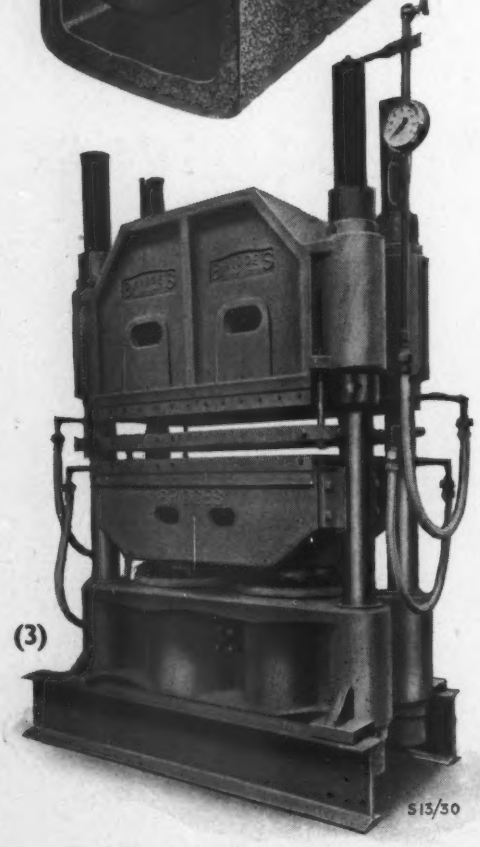

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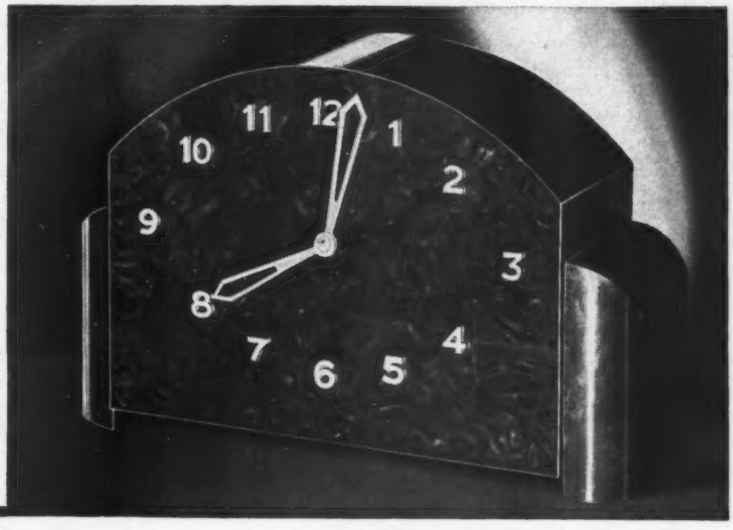

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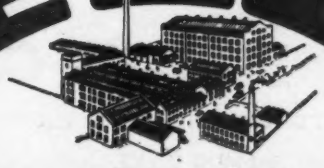

MOULDINGS
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37/10

FOR EVERYTHING
ELECTRICAL
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OTHER USES

PRODUCTS OF **BIRKBYS LTD.** LIVERSEDGE·YORKS

George H. Scholes & Co. Ltd
ELECTRICAL ENGINEERS MANUFACTURERS

WYLEX WORKS
WYTHENSHAWE
MANCHESTER

4th June 1937

P/MS

CE/1

Messrs. The Beetle Products Co. Ltd.,
Ideal House,
1, Argyll Street,
LONDON, W. 1.

Dear Sirs,

We thank you for your letter of the 3rd instant with regard to the advertising of the non-tracking qualities of "SCARAB", and in respect to this point we give you permission to feature "Wylex" in your advertisements.

After exhaustive tests some years ago, we satisfied ourselves that "Scarab" had definite non-tracking qualities, and these qualities have been proved and maintained.

We believe the non-tracking moulding needs bringing more to the fore in the electrical trade. It is still little known and if it becomes better known there will be a bigger demand for it by other electrical manufacturers.

We are sending you samples of some of our mouldings, which we mould in "Scarab", for you to prepare photographs for your advertisements.

We are, dear Sirs,
Yours faithfully,
For GEORGE H. SCHOLES & CO. LTD.
Director.

LONDON OFFICE: ALAN WRIGHT, GRAND BLDGS., TRAFALGAR SQUARE, LONDON, W.C.2. PHONE: WHITEHALL 2201

The best accessories demand the best insulation—therefore, for their "Wylex" fittings, George H. Scholes & Co. Ltd. . . .

Specify
Scarab
for
Safety's sake

THE BEETLE PRODUCTS CO. LTD.

(DIVISION OF BRITISH INDUSTRIAL PLASTICS LTD.)

IDEAL HOUSE
1 ARGYLL STREET
LONDON, W.1

POPE'S LANE
OLDBURY
WORCESTERSHIRE

CHRONICLE BUILDINGS
CORPORATION STREET
MANCHESTER

Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials.

Vol. 1. DECEMBER, 1937 No. 7

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"PLASTICS" is published in London, England, at the beginning of each month.

Head Offices: 5-17, Rosebery Avenue, London, E.C.1.

Inland Telegrams: "*Pressimus, Smith, London.*"
Cables - - "*Pressimus, London.*"
Telephone - *Terminus 3636 (Private Exchange).*

Midland Offices — Birmingham: 61/65 New Street.

Telephone—Midland 4117 (3 lines).
Telegrams—"Presswork, Birmingham."

Coventry—6, Warwick Row.

Telephone—Coventry 4775.
Telegrams—"Presswork, Coventry."

Northern Offices—Manchester: Deansgate House, 274, Deansgate.

Telephone—Blackfriars 5038-9.
Telegrams—"Presswork, Manchester."

SUBSCRIPTION—"PLASTICS" will be mailed regularly to any address in the United Kingdom or abroad for—

Twelve issues for 15s. post free; Canada and Newfoundland, 12 for 13s. 6d.; pro rata for fewer numbers.

COMMUNICATIONS—All letters regarding subscriptions, advertisements and other business matters must be addressed to The Manager, 5-17, Rosebery Avenue, London, E.C.1.

TEMPLE PRESS LIMITED

Proprietors, Printers and Publishers of "The Motor," "The Light Car," "The Commercial Motor," "Motor Cycling," "Cycling," "The Motor Ship," "The Motor Boat," "The Oil Engine" and "The Aeroplane."

5-17, Rosebery Avenue, London, E.C.1

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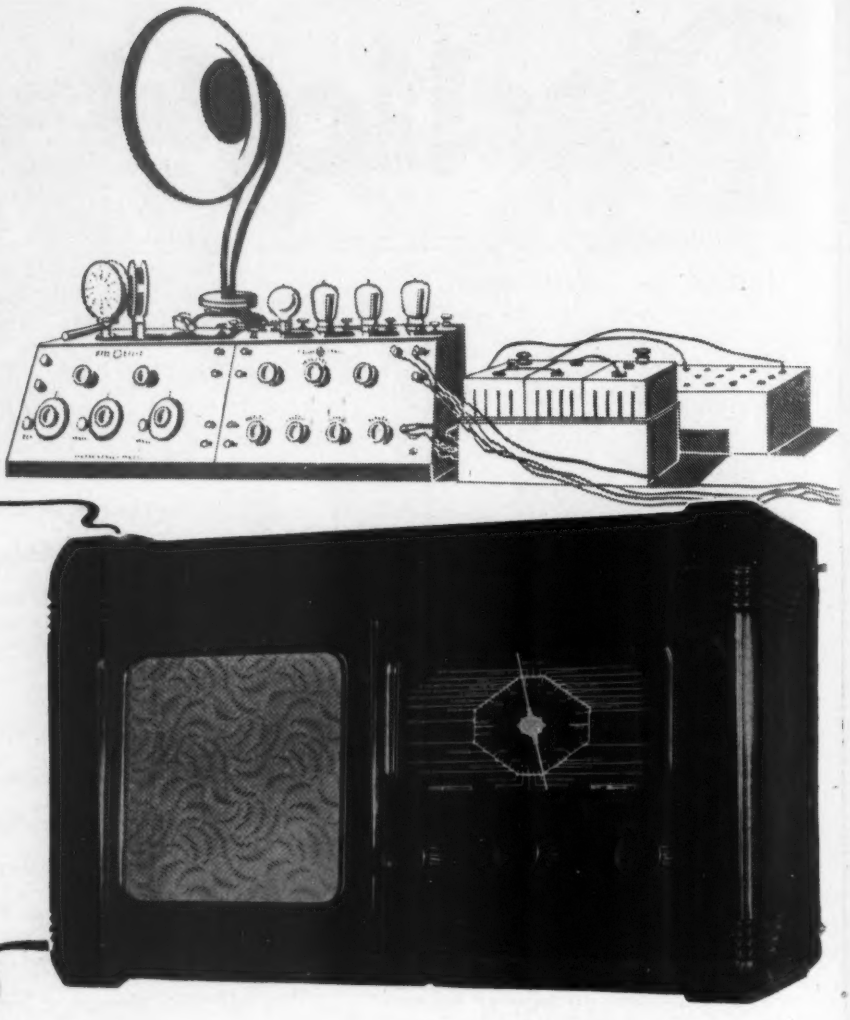


Refashioning Everyday Articles for Greater Convenience

The Wireless Set acquires Attractive Simplicity

IN the development of the modern wireless set BAKELITE Materials have played an important part. BAKELITE Sheet is used for the all-important electrical insulation of the various components, BAKELITE Varnish for the impregnation of coils and loud speaker cones, and many of the excellent sets which are available to-day are housed in cabinets moulded from BAKELITE Moulding Materials.

BAKELITE Moulding Materials possess a unique combination of physical properties: mechanical strength, electrical insulation, resistance to heat, moisture, acids and alkalis, and many special grades are available.

These factors and the practicability of moulding the materials into the most complicated shapes have provided the solution of many manufacturing problems.

Further information will be supplied, on request, by the manufacturers:—

BAKELITE

Registered Trade Mark TREFOIL

THE MATERIAL OF INFINITE USES

BAKELITE LIMITED, 68, VICTORIA STREET, LONDON, S.W.1. Telephone: VICtoria 5511 (5 lines). Works: BIRMINGHAM (Est. 1910).

Vol. 1. No. 7. DECEMBER, 1937

Plastics

Dealing with the Manufacture, Uses and Potentialities of Plastic Materials

Proprietors - - TEMPLE PRESS LIMITED
Managing Director - ROLAND E. DANGERFIELD

Editor - - M. D. CURWEN, B.Sc., A.I.C.
Offices - 5-17, Rosebery Avenue, London, E.C.1

PLASTICS AND METALS

THE past few months have been singularly opportune for an examination of what is called the hardware trade, and it would be useful, we think, for the plastics industry to consider how far plastics, in view of their special properties, can enter into what is more or less a monopoly of the metal industry.

The time is opportune for one reason especially. Metals, in particular steel and steel products, have become almost a nightmare to some consuming industries, not because of price, which although high is not fantastically so and we are told will rise no higher, but because deliveries are so delayed. We were informed recently by the director of a Yorkshire firm that he could not promise deliveries of simple galvanized-iron water tanks under six months. Some steel firms could not deliver under 12 months. Most of the steel goods producing industries are in the same plight. We do not wish to suggest that the plastics-moulding industry is much better off, for it is also a consumer of steel for moulds, but it appears an admirable moment to show the hardware industry that materials alternative to metals are available.

Nor are we foolish enough to believe that, even under such awkward conditions, a manufacturer will rush round and buy a tank made of synthetic resin just because he cannot get delivery of a steel one. The price, for one thing, is too high, since they are only used for very special applications, such as the chemical and dyeing industries. He would rather patch up the old one and carry on somehow until he got delivery. But the important fact is that the "plastic" tank has replaced the metal one in industries where metals would be quite useless after a few months' working.

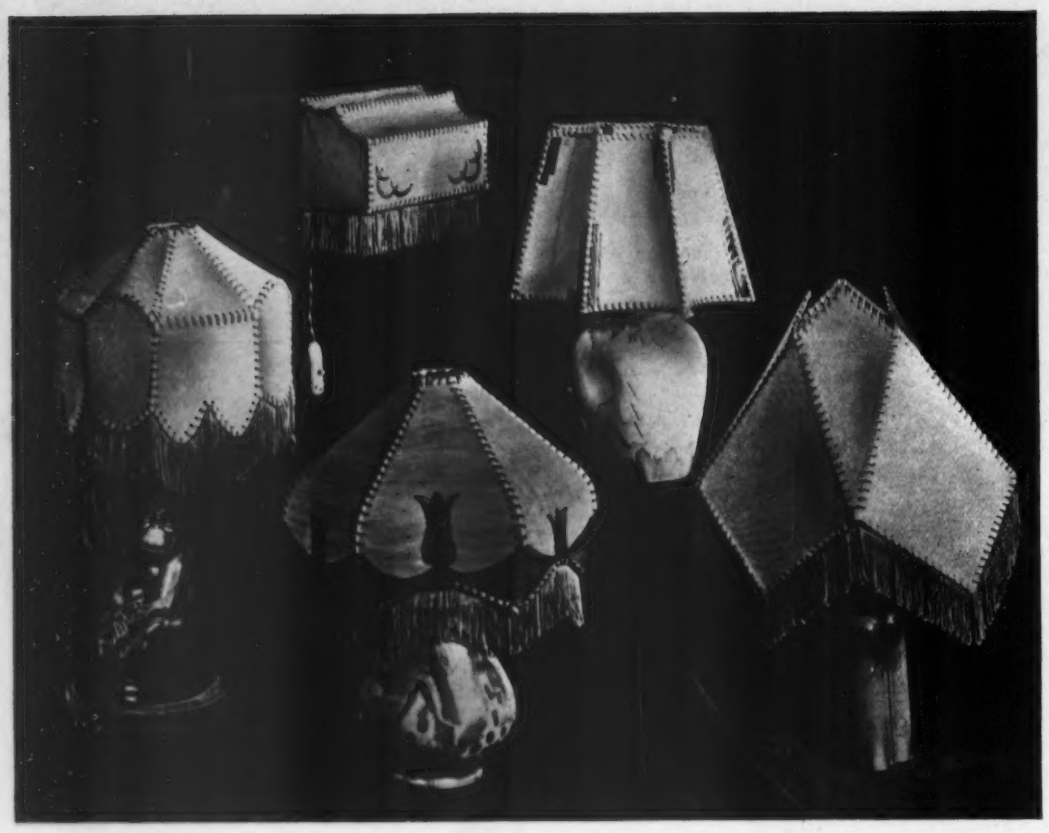
Obviously, there is nothing like steel for a vast number of jobs, nor should we suggest the use of anything but metal where metals are best suited. Equally, however, there is nothing like plastics, and we submit that there are innumerable articles which need not, and indeed should not, be made of metal.

That some manufacturers are already fully alive to this is obvious when we examine furniture hardware. The metal door-knob no longer holds the place it did since plastics entered the field. And, praise be, the brass door-knob and the brass knick-knack are, to the delight of the housewife, as dead as the dodo. Metal finger-plates, likewise, cannot be compared for beauty and utility with the plastic type. Yet another advance has been made recently—the plastic letter-box "slit"—where ½ lb. of ugly black iron or brass that required eternal cleaning is replaced by a delicately coloured yet strong oblong of moulded material weighing a few ounces. Drawer-knobs and drawer-pulls are merely repetitions of door-knobs and have been widely adopted in the form of plastics.

One large firm at least is producing electric fires with moulded surrounds, and we believe it will not be long before the entire stand, especially in those heaters with imitation fires fitted to them, will be similarly constructed. The gas fire, especially the portable type, also lends itself admirably to such treatment.

It has long been the pride of British manufacturers, especially those who work in metal, that their goods are made to last—that "it will hold a house." In many ways this is admirable, and we have built up a very fine reputation throughout the world because of it. But this practice has often been carried to absurd lengths; heavy pieces of metal are made where strength and weight are of no importance and, indeed, where the latter is a disadvantage. It is among such objects that we must search as outlets for plastics—light cupboard catches, light bolt-plates, curtain rings and rails, towel rollers and so on.

A surprising application of plastics to hardware which has just come to our notice is the reported manufacture of scissors. Surprising, because at first sight we cannot imagine the scissors to be anything but an all-metal product. Not so however, since, after all, it is only the two cutting edges that do the work. A scissors held up to the light and examined edge-on will quickly show this. An ingenious German inventor has brought out a new type in which two thin steel blades are retained as the cutting edges, but they are embedded in synthetic resin, thus providing a desirably light instrument. The resin part is not as strong as steel, but the strength of steel is *not* required. And think of the saving in transport costs!



An exquisite range of shades made of Rhodoid cellulose acetate.

NEW LAMPS FOR OLD

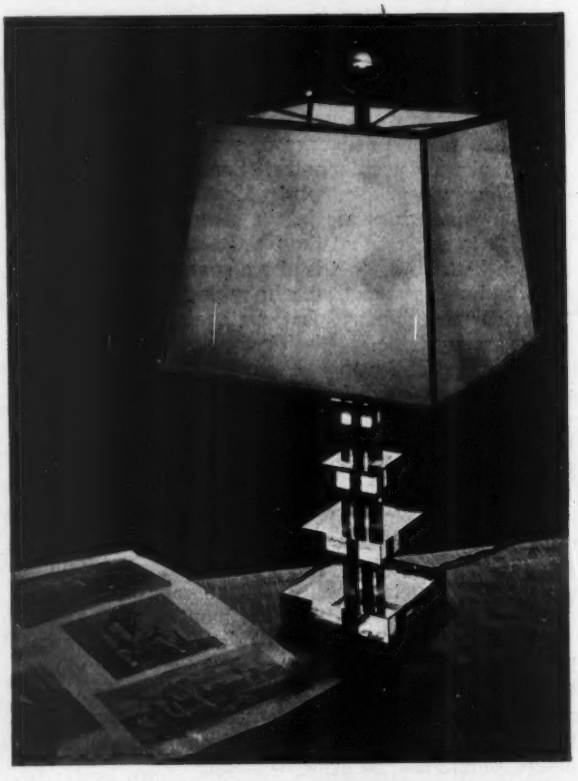
NEITHER Aladdin with his reputed magical lamp nor nineteenth-century Ruskin with his seven, ever cast such beams on this world as does the lamp of 1937.

To-day, more than ever before, has it become an insistent and powerful implement of decoration, one so bound up with our modern social existence. It is by the light of the lamp that so many hours of our waking lives are spent, and it is within our power to make these hours soothing or gay as we please. So varied in shape, in decoration and in colour are the possibilities, that the wearied brain may be quietened and the jaded mind enlivened at will.

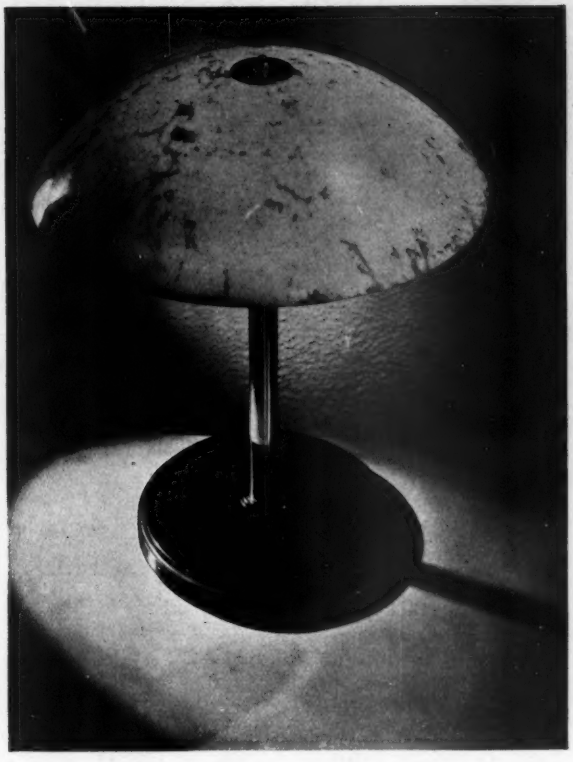
As much as any other employing decorative art, the lamp industry is continually searching for raw materials for new fashioning. Wood, metals, parchment, a host of fabrics, marble and alabaster have all been employed and are still being employed with considerable effect.

The coming of plastics has made a very deep impression on this class of manufacture, for not only has it provided a new raw material or sheet or rod, coloured as no other material can be coloured, or transparent as no other material except glass can be transparent, but promises also to give the industry new forms of design that cannot be obtained by any other means.

Cellulose acetate sheet is an admirable material to work with for the production of shades, and has already



A Modern Design in a Modern Plastic. The entire stand is of Catalin cast phenol resin.



Two beautifully designed shades moulded by Moulded Products (Australia) Pty. Ltd. Bases and shades are of Beetle.

taken its proper place as one of the most acceptable of raw materials for the manipulator's art. It is flexible, easily cut with scissors or knife, is colourful or transparent; it can be embossed or decorated with designs in intaglio, and slotted or holed to carry decorative cords and beads. More recently special effects such as interleaving with lace and other delicate fabrics have been introduced. For the housewife there is the added attraction of washability, strength and non-inflammability.

To-day, the solid, as distinct from the sheet, plastic enters the field, and here we attack the problem of the base and stand of the lamp.

The cast resins have given us a strong and beautiful material in the form of rods and plates which can be worked with cutting tools into any desired form, and so at once becomes a raw material for individual and distinctive design, one, moreover, peculiarly adapted, because of its inherent properties, for very modernistic art.

If we take the lamp shown at the foot of the previous page as a good example, one can truthfully say that we have here a combination of properties that cannot be reproduced by any other means. Shape, transparent beauty, tougher than glass and as highly polished and light reflecting, and unbreakable. Moreover, the material is of the right weight, by no means as heavy as alabaster or metal, yet heavier than wood—and perfectly stable.

Finally, we may consider the lamp, both shade and stand, as a more or less entirely moulded product. The advent of this type has been enormously facilitated by the improved technique in the production of amino resins of the transparent and translucent type. Here, not only have we beauty of texture, and great strength, but by the moulding process we open up new possibilities with regard to shape. Using fabrics, there are certain narrow limits we must work to, since manipulation and shaping is carried out on a wire support. Perfectly even and round forms are virtually impossible with silk, for example, owing to sagging of the fabric. In plastics we encounter materials even more mouldable than glass, and substances that lend themselves to an amazing variety of artistic treatment.

The accompanying photographs show the delicate effects that have been obtained with amino resins.

A group of shades for hanging lamps moulded of Beetle by J. S. Peress, Ltd.

A real novelty of everlasting crackers. Each contains a perfume bottle. Moulded in cellulose acetate by Inlay Mouldings, Ltd.

What Shall I Give for Christmas?

by GORDON RICHARDSON

ONCE again Christmas self-questioning time is with us—delightful, yet terribly harassing. What to give, and will he (or she) like it? So much to buy and so embarrassingly wide the choice. As perplexing as the profoundest of scientific problems and as much hope of making a quick decision as of chaining a will-o'-the-wisp. The season of delicious uncertainty is upon us.

Was it *Punch* that said:—

"What shall we give him this year?"

"Oh! Let's give him a book."

"No! He's got a book."

Since we are all book lovers we laugh at this "dizzy" reply, but we can also see the desire for novelty, for giving something new, at least something "different."

Well, let's get down to it. What shall we give? Is it to be merely costly or something sentimental, something beautiful or merely useful? I plump for useful things, and while we're on the subject, is it not a sign of the times that so many advertisements in the papers urge us to give her useful presents? Jolly good idea, too. No more pearl necklaces or fur coats. We're told now to give her a "Whizzo" vacuum cleaner or a "Tear-em-up" electric washing machine or a refrigerator or an electric iron, which seems suspiciously like a plot to undermine the "Freedom for Women" movement.

But what concerns us more is that the situation of Man is unchanged. He remains unconsidered and apparently he is still to get his box of cigars, his polychromatic tie and the blazing dressing gown he'd rather die than wear. Not much imagination, is there? Surely it is time for a change here? Does he not want something useful too?

I remember one occasion listening to a conversation between two ladies on top of a bus, wending its way one dark night down Wapping way:—

"'Ow's Bert gettin' on?"

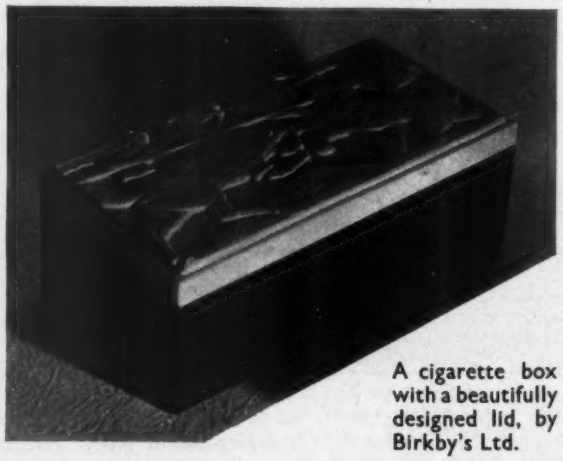
"'E's coming out afore Christmas."

"Wotcher goin' to giv 'im?"

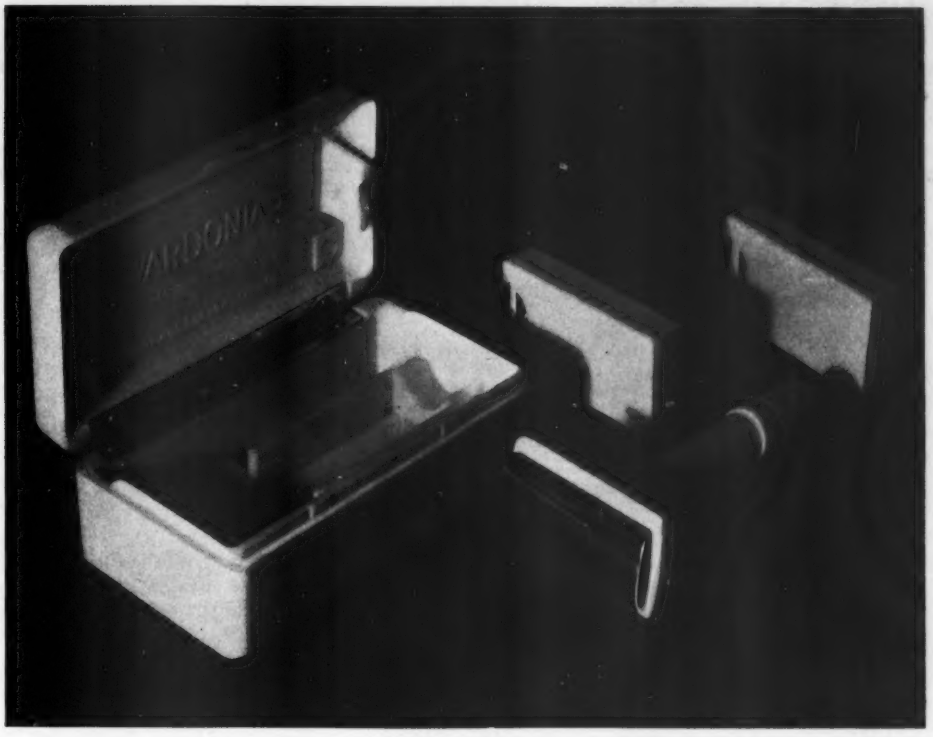
But they saw my trembling ear and the rest was silence. And I thought, what will she give him? A nice new and polished jemmy or a pound of nitroglycerine? No, the modern burglar wants a 100-guinea box of vanadium steel tools or an oxy-acetylene metal cutting set to do his work properly to-day, and, poor soul, she didn't look as if she could afford all that. Perhaps she wasn't thinking of useful presents at all, perhaps just another tie—or a nice thick ear for having got into trouble.

Few women ever think of giving useful things. I once knew a rich road contractor who gave his wife a new motorcar to do her shopping. But did she reciprocate? No! Just the usual box of cigars. Never a steam roller—not even a little asphalt heater.

I know that if I were a manufacturer nothing would please me more than to receive something sensible at Christmas; a nice new boiler, an air compressor or a three-stage pump. That's, of course, from rich friends. The ordinary poor ones might send a few yards of machinery belting, a 10-gallon can of lubricating oil or



A cigarette box with a beautifully designed lid, by Birkby's Ltd.



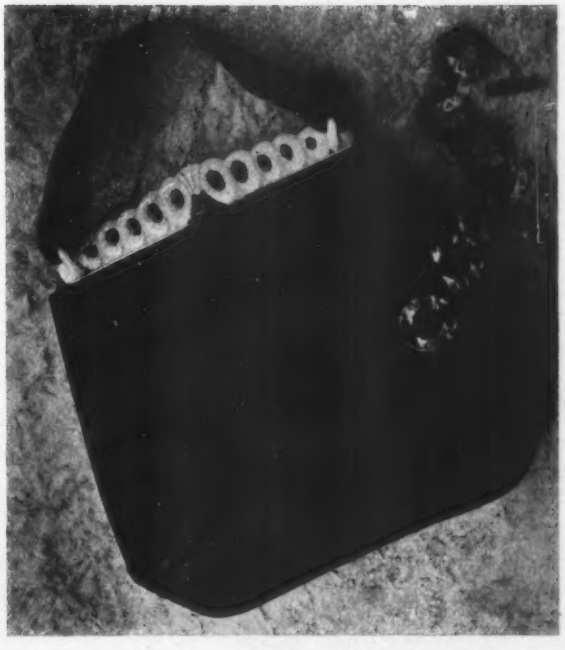
Wardonia's contribution to Christmas-tide.

half a dozen packing barrels. There's so much from which to choose!

However, we are very far from this ideal and we must still give the merely beautiful. Or perhaps with the beautiful we can combine the useful.

Luckily we now have plastics, and if anything can give this combination of properties plastics can.

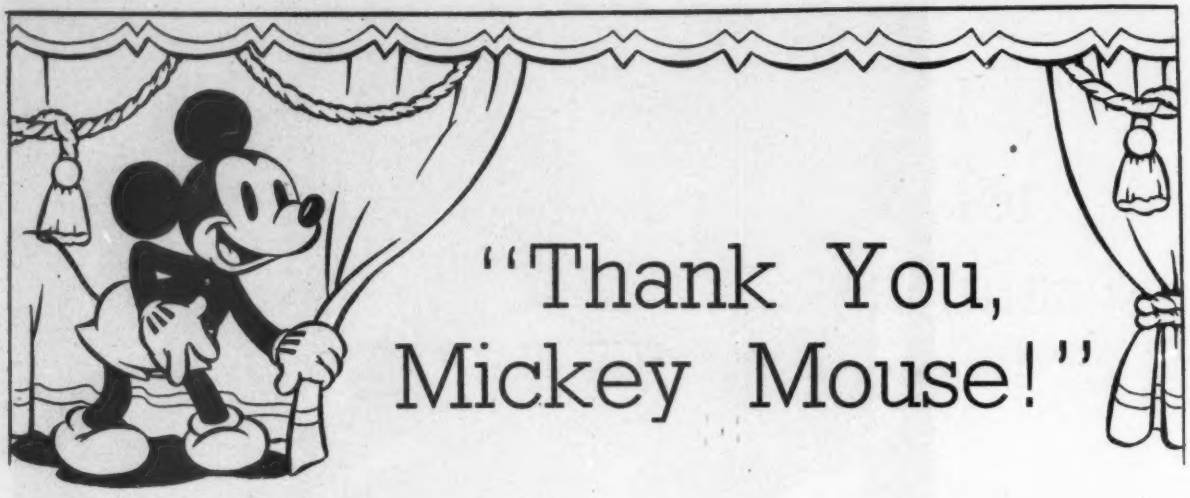
On our coloured page you will find a remarkable collection of plastic goods eminently suitable as Christmas gifts, dressing-table sets, jewel boxes, picnic sets, occasional tables, cake trays and a dozen other things of rare beauty, rich colour and everlasting life. Indeed, there are few pages in this issue that do not contain a novel and useful present suitable at this or any time of the year. Will you give a lamp this year? Here are lamps of plastics that last year were deemed impossible of production. A cigarette box? Here is one in black and gleaming white with a miraculously designed lid. A handbag? Here it is, with a plastic decoration that the ivory carvers of the world will envy. Clocks or hair dryers, vases of translucent beauty, shaving implements and pens, radio cabinets or tea trays, glittering jewels or unstainable tables—a thousand and one from which to choose.



A lovely hand-bag and bracelet of Catalin cast-resin.

The chic umbrella for the chic woman.

What shall you give? Make your own choice; but see that it's in plastics!



"Thank You, Mickey Mouse!"

YES! the plastics industry owes a considerable debt of gratitude to Walt Disney's world-famous characters, as Mickey Mouse, Donald Duck and the Three Little Pigs are helping to sell more and more plastic goods every month. It is interesting to quote from the experience of Mr. Vernon S. Porter, director of S. Maw, Son and Sons, Ltd., who said in an interview: "Soon after George Kamen, Walt Disney Merchandise man, landed in England, we fixed up a licence for Disney tooth brush holders in the shape of Mickey and Minnie Mouse, Donald Duck, the Three Little Pigs and other popular Walt Disney characters. In three years we have sold well over 2,000 gross of these holders to the British market—big figures for what was previously a very small selling item.

"Since then, we have handled quite a range of Disney character merchandise, including Mickey Mouse tooth and nail brushes, Mickey Mouse hot-water bottles and Disney sponge toys. We have been successful with all these ventures. Walt Disney character merchandise is intriguing, it can be attractively packed and it is capable of vigorous merchandising. In our experience Disney goods fetch good retail prices and show our retail distributors a generous margin of profit. Repeat business over a long period is an interesting feature of the sales curve."

Some of the most popular lines of Disney plastic articles are made by The British Xylonite Co., Ltd., and Cascelloid, Ltd., who have licences for the manufacture of a large number of Mickey Mouse novelties. The Mickey Mouse Party Set made by The British Xylonite Co., Ltd., is packed in one of the most attractive cartons we have yet seen and one which makes a very striking window or counter display. The Addis Brushworks, Hertford, is another firm manufacturing a successful range of plastic ware in the form of Mickey Mouse tooth brushes and nail brushes.

A licence for the use of one or more of the Disney characters can be obtained by any firm interested, provided, of course, that their goods will not compete with other licensees. There are, however, a number of new lines possible for prospective licensees, such as kiddies' bookcases, lamp standards (but not shades), buttons and dozens of other novelties. The cost of a licence is reasonable when one considers the enormous sales pull of Mickey Mouse, and it is arranged on a royalty basis which is a percentage of the total turnover of the new line.

In addition to allowing the licensee permission to use a set of characters for a particular line of goods and, indeed, granting him a virtual monopoly, Walt Disney-Mickey Mouse, Ltd., also offer present and prospective licensees good and useful service in their designing, merchandising and advertising problems, and Press publicity given to Mickey Mouse films reacts very favourably on all goods showing the characters. There is no doubt that Disney's first feature film, "Snow White and the Seven Dwarfs," which has been three years in preparation and is made up of over 250,000 individual drawings, is going to prove splendid publicity for those manufacturers who are using or about to use these characters. Already several well-known firms, including The British Xylonite Co., Ltd., have agreed to use Snow White characters and excellent business is expected.

It is estimated that the value of Mickey Mouse merchandise sold from January to December, 1936, reached the colossal total of £1,650,000. The returns for plastic goods are not known, but they must be considerable and yet saturation point is a long way off and there are plenty of opportunities for profitable lines. A Merry Christmas, Mickey Mouse, and all the best for 1938!

This Mickey Mouse Party Set made by The British Xylonite Co., Ltd., is most attractively designed and packed.

"General Release"—ENGLISH

New and Interesting Plastic Goods

SIMPLY designed and modernistic, these clocks moulded of Bakelite by Crystallate, Ltd., appeal to us as most acceptable gifts.

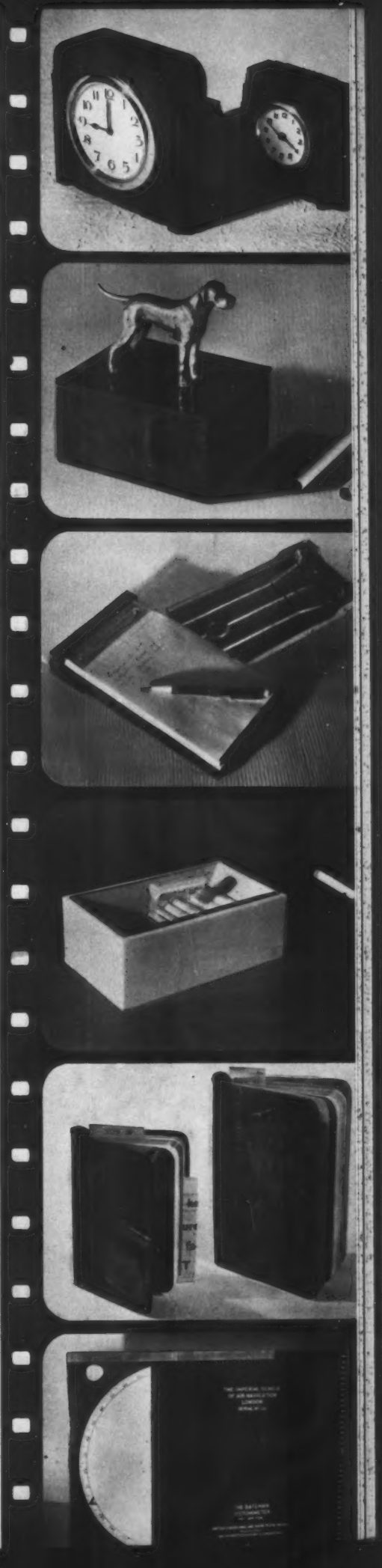
THE number of cigarette boxes given away at Christmas must run into some hundreds of thousands. For discriminating donors we recommend this attractive and yet strongly made box of Catalin. The lightly mottled colour is most attractive, and the non-chip finish is very pleasing indeed.

MAKE a note of it on this new desk blotter with a strong Bakelite base. The Standard Insulator Co., Ltd., has turned out a very well-finished piece of work, which should prove a most acceptable gift to the business man and his secretary.

YET another cigarette box and one which harmonizes particularly well with modern furniture and settings. The material is a delicate ivory shade of amino resin, and the box is moulded by G.M.C. Mouldings, Ltd., to whom credit is due for pleasing design and excellent workmanship.

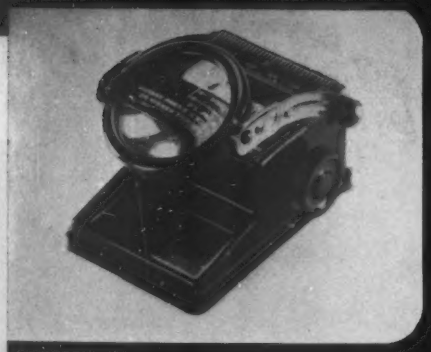
MOST people start off the New Year with the determination to keep a diary, but this good resolution is seldom kept. It has been pointed out to us by Messrs. Charles Letts and Co. that one of the most certain ways to encourage the diary habit is to make a present of one of their latest Rhodoid bound pocket diaries.

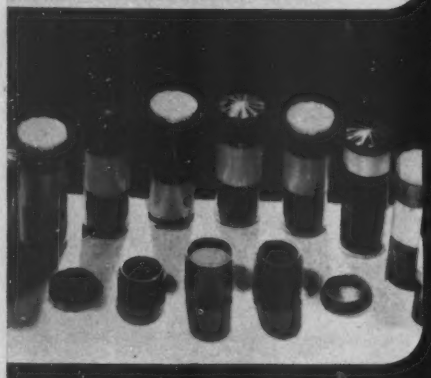
FOR our air-minded readers this new aeronautical instrument, the Bateman Vectommeter, manufactured by the British Engraving and Name Plate Manufacturing Co. and designed by Flight Lieutenant John W. Bateman, R.A.F.O., will, no doubt, be of considerable interest, especially as the calibrated cover is made of Bakelite, which shows yet another use for this most versatile of all plastics.

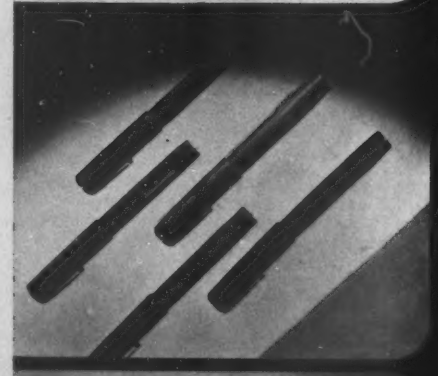


WHAT are you giving for Christmas? Whatever it is, see that it is in plastics. There is ample from which to choose. Especially noteworthy in the above collection are the two tables of very novel design which can be converted into fire screens. These and the cake stand were moulded by Insulators Ltd. from phenol and amino plastics for Messrs. Cook and Morum.

1. *Desk tidy of Bakelite moulded by The Standard Insulator Co., Ltd.*
2. *Hair-dryer of Bakelite by the Ormond Engineering Co., Ltd.*
3. *Man's dressing table set of Xylonite and Bex by The British Xylonite Co., Ltd.*
4. *Ladies' dressing table set also of Xylonite and made by same firm.*
5. *Thermos flask and jug set moulded of Mouldrite Amino resin by Mouldrite, Ltd., for Thermos (1925), Ltd.*
6. *Ladies' dressing table set made of Xylonite by The British Xylonite Co., Ltd.*
7. *Kiddies' party set moulded of Bex by The British Xylonite Co., Ltd.*
8. *Manicure set of Xylonite by The British Xylonite Co., Ltd.*
9. *Nursery goods by The British Xylonite Co., Ltd.*
10. *Smoker's requisite moulded of phenolic resin by The British Xylonite Co., Ltd.*
11. *On the left a cigarette box moulded by Birkby's, Ltd., and on the right a cigarette box moulded by Stadium, Ltd.*
12. *Clock with amino resin case moulded by The British Xylonite Co., Ltd.*
13. *Elo Fishing Reel moulded of Bakelite by Birkby's, Ltd.*
14. *Fruit squeezer of amino resin moulded by Lorival Manufacturing Co. (1921), Ltd.*
15. *Moulded shaving requisites by Rolls Razor, Ltd., also Halex shaving brush.*
16. *The latest Mischief Perfume container moulded of Black Scarab by the Streetly Manufacturing Co., Ltd.*
17. *Fruit squeezer of amino resin by The British Xylonite Co., Ltd.*







"General Release"—AMERICAN

New and Interesting Plastic Goods

PHILATELISTS will welcome this Roto-gage for measuring postage stamps. It is moulded of Bakelite by Imperial Moulded Products Corp., U.S.A., and handled in this country by E. B. Meyrowitz, Ltd.

WEIGHING only ½ oz., the new Durez make-up kit is definitely in the Christmas news. It is made in 12 different colour combinations, and there are several interchangeable sections, each section forming a complete container. The moulders are Colt's Patent Fire Arms Manufacturing Co.

FOUNTAIN pens are always welcome gifts, and these should be particularly acceptable. They are injection moulded of Lumarith by H. P. and E. Day, Inc., Seymour, Conn., for Esterbrook Steel Pen Manufacturing Co., Camden, N.J., U.S.A.

THESE toilet accessories of singular grace and beauty are particularly interesting because they represent the first work of this kind in cellulose acetate undertaken in America. They are now being moulded from Lumarith cellulose acetate for the Amerith Division of Celluloid Corporation, New York, U.S.A.

THESE colorful injection-moulded toys of Lumarith cellulose acetate are light, wash easily, and retain their bright, cheerful colours indefinitely. They are made by the Kilgore Manufacturing Co., Westerville, Ohio, U.S.A.

THIS smartly designed Razorette is just now on the American market, and it is expected to have a wide sale, especially during the Christmas season. The Tenite case made by Chicago Moulded Products Corp., U.S.A., is produced in two halves by the extrusion process, and these measure approximately 2⅜ ins. long by 1⅜ ins. wide at the widest section.

Motor Handrail INSULATION

With Cellulose Acetate Tubing

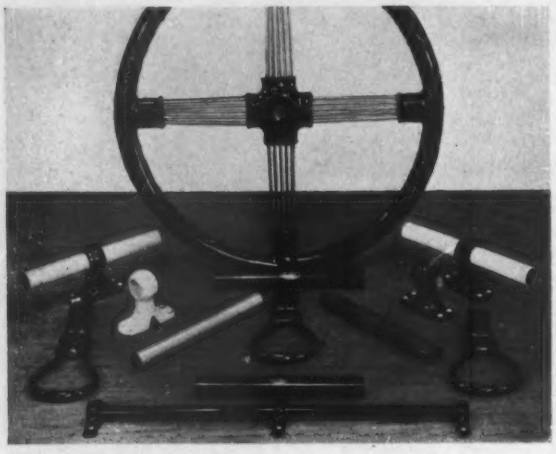
Interior of the A.E.C. Sunderland bus, showing handrails covered with Exceloid tubing.

ONE of the most interesting exhibits at the Commercial Motor Show held at Earls Court, November 1 to 13, was the stand of the Exceloid Co., Ltd., where a number of cellulose acetate covered handrails and brackets for commercial vehicles were shown. Several well-known coachbuilders, particularly Messrs. Chas. Roe, Ltd., were exhibiting coaches fitted with tubing made by this company, which produces some remarkably fine work in a great variety of colours. These range from a delicate silvery tint to walnut and black; indeed, there is practically no limit to the range of shades now available.

Mr. Birnie, managing director of Exceloid Co., Ltd., Lichfield, Staffs, pointed out that trams, petrol buses and trolleybuses throughout the country are now installing cellulose acetate covered handrails. A considerable impetus has apparently been given to the use of this material by the fact that on all trolleybuses it is now compulsory to insulate the bulkhead handrails, also the vestibule commode and platform stanchion handrails. Exceloid tubing is widely chosen for this purpose as it affords excellent insulation and is, in fact, tested up to 10,000 volts. Another and well-known characteristic of

cellulose acetate covered handrails is their warmth to the hand. Tubes made by the extrusion process vary in thickness from 10 thousandths of an inch to 85 thousandths, and the diameter from ¼ in. to 2½ ins., rising by ⅛ in. The special Exceloid process ensures that in 24 hours the tubes are fully matured, and after that time there is no shrinkage of any kind.

Mr. Birnie is confident that the future of cellulose acetate for coach fittings is very promising, and he looks forward to the time when dashboards and panelling will be made of sheeting, which is not only able to resist plenty of hard wear, but is also resilient and able to stand up to vibration and shocks without cracking or, indeed, showing any signs of strain.

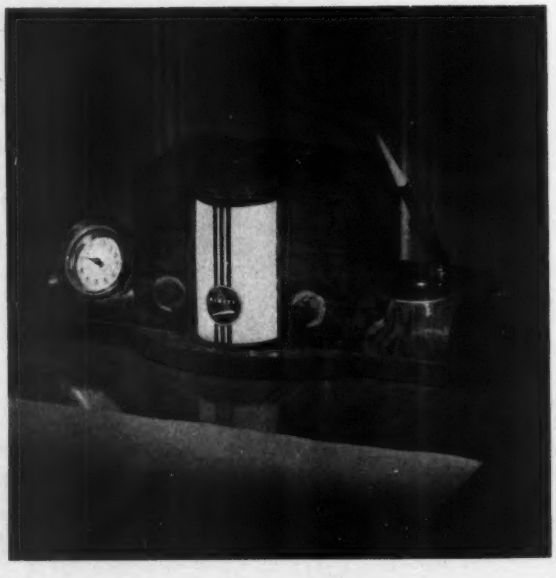


(Above) Another example of acetate tubing for bus interiors. (Left) Group of Exceloid-treated accessories displayed on the firm's stand at the Commercial Motor Show.

Clock-Radio-Writing Set All in One

This is surely one of the most ingenious desk sets in the world and claims, with excellent reason, to take the place of half a dozen gadgets which have become indispensable on important desks. It is only 15 ins. long, but it gives American business men the correct time—news, market reports and everything else that comes on the air—as well as a complete writing set that never fails.

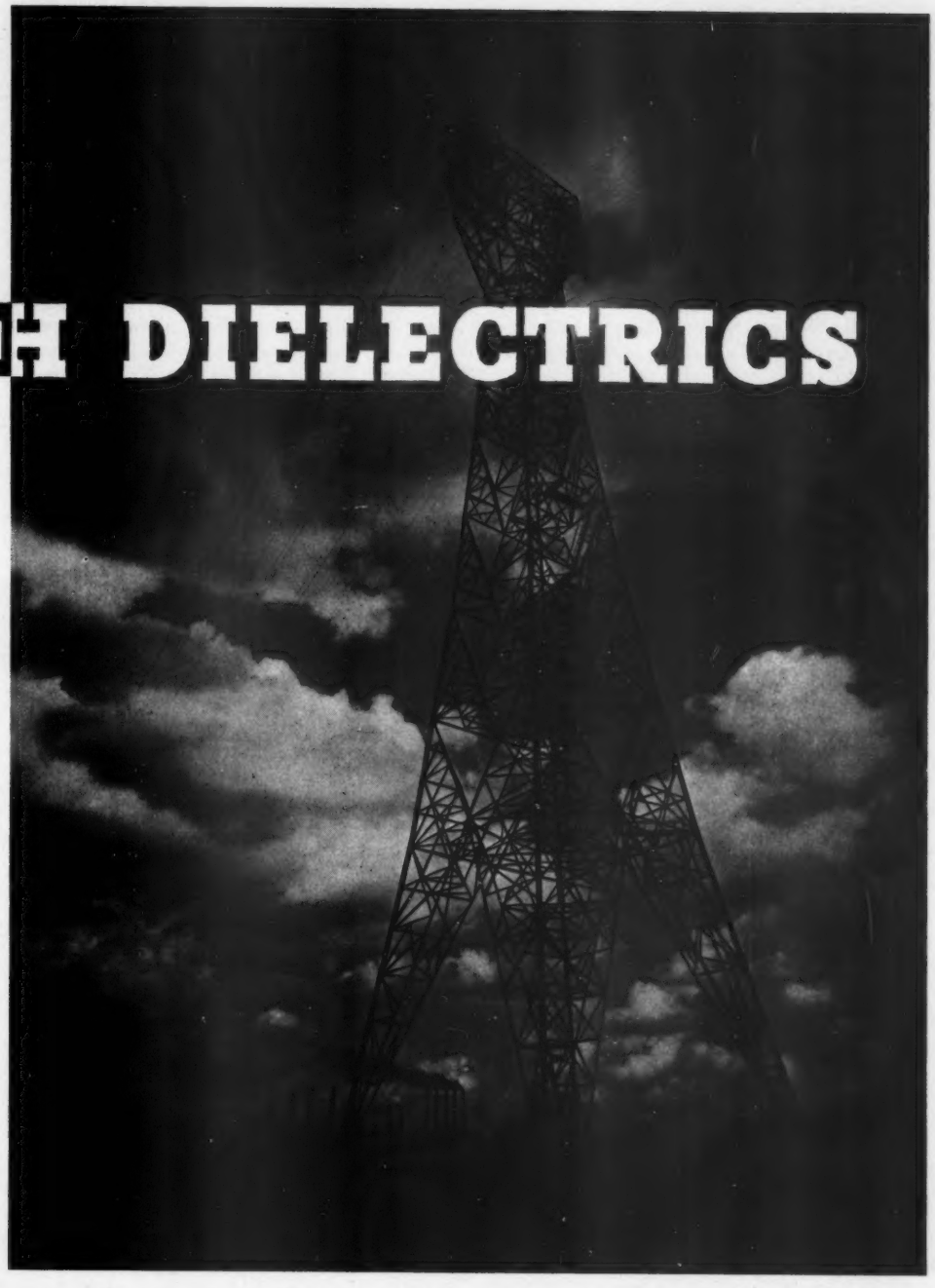
The Airite set is, without doubt, one of the most attractive moulded jobs of the year. Plaskon is used for the light colours, marble or ivory, and Bakelite for the black or walnut shades. The Chicago Moulded Products Corporation, U.S.A., mould the case for the Sengbusch Self Closing Inkstand Co., Milwaukee, U.S.A.



The Airite set is functionally designed and yet fulfils all the requirements for a really handsome radio.

For

HIGH DIELECTRICS



USE

MOULDRITE

PRODUCTS

For technical information and advice regarding Phenol and Urea Formaldehyde powders and resins; "Perspex" and "Diakon"; acrylic resins in sheet and powder form, write to:—

IMPERIAL CHEMICAL INDUSTRIES LIMITED
(MOULDRITE LTD.)
NOBEL HOUSE, 2, BUCKINGHAM GATE, LONDON, S.W.1
'Phone: VICtoria 8432
Midland Sales Office: LOMBARD HOUSE, GT. CHARLES STREET, BIRMINGHAM. 'Phone: CENtral 2765

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MOULDERS IN

BEETLE TRANSPARENT

STREETLY MANUFACTURING CO., LTD.

London Office: IDEAL HOUSE, 1, ARGYLL STREET, W.1

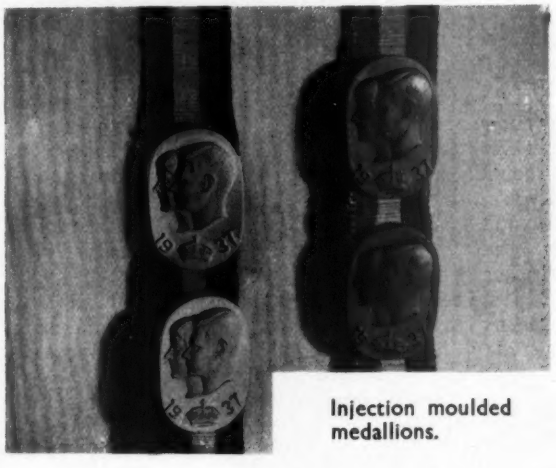
Works: STREETLY, SUTTON COLDFIELD, Nr. BIRMINGHAM

Ideas—

By the EDITOR

Plaques in Plastics

Mr. Eyssen, of Hydro-Plastics, Ltd., reminds me of my early inquiry for plaques by sending me a number of medallions in thermoplastic material of which those of the King and Queen are excellent examples. The photograph shows them full size. Thank you, Mr. Eyssen, but I am waiting for the very courageous individual who will make and put on the market a really large plaque about 6 ins. by 8 ins. of some person sufficiently beloved or famous that would



Injection moulded medallions.

enable the sale to be large. I suggest first the King and Queen and the young Princesses. I feel sure that one of Princess Elizabeth would have an enormous sale all over the world and would appeal especially to children. A famous musician or perhaps Mr. George Bernard Shaw would also be suitable subjects for such treatment.

Anti-Foam Device

E.W., of Glasgow, takes us to task for our note on the metal disc we described last month which is used to prevent "over-boiling" of milk. "With reference to the 'Rodney' device," he writes, "for preventing milk boiling over, both your correspondent and yourselves appear to have missed the important point which is the weight or rather specific gravity of the glass or metal at present used. I fear that not only would a plastic be disintegrated by repeated boiling, as you point out, but that such a disc would not even do its job satisfactorily."

I agree that weight is an important point, but by far the most important in the argument is that plastics will not do the job and there was little object in going farther into the matter. Actually, there would be no great difficulty in making the weight by moulding round a metal disc. And if plastics were possible, the most economical method would probably be by spraying the metal disc with a synthetic resin stoving lacquer. The stoving, at about 120 degrees C., results in an extremely tough and hard layer of resin.

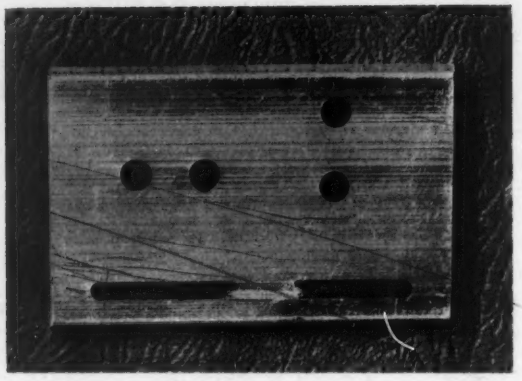
Our Summer Hats

My note in last month's issue regarding this subject has brought a letter from Mr. T. L. Garner, the well-known rubber technologist. "I notice," he says, "that on page 229 you comment on an idea for production of men's hats from light canvas by dipping in cellulose compound, and comment on the possibility of suitable types of lacquer for this purpose. You will be interested, no doubt, to know that I recently came across a patent taken out in Germany for fabric articles moulded or shaped, such as hats, formed from yarns coated with lacquer containing thermoplastic polymerisation product. Examples given describe the use of 'vinyl' and 'acrylic acid' resins. The excess of the lacquer was removed by passing the coated yarn through a rubber nozzle."

Ladies' Belts

I have been sent a fine example of what can be made from the vinyl type of synthetic resin, in this instance Mipolam. Each strand is an extruded tube and the whole has been simply plaited to form a belt, which is not only exceedingly pliable, but elastic. As each strand is coloured differently, a very pleasant effect has been obtained. It will be seen that the ends

have been welded together by simple application of heat, so that unravelling, except by deliberate cutting, is impossible.



As a result of the note on "Clock Faces by Injection" we published last month, we have received an example of the injection moulding of plastic numbers in metal, from the well-known German firm of Eckert and Ziegler, G.m.b.H., the specialists in injection moulding machines, who state that they have carried out such work for some few years. The specimen we have photographed is of dark blue letter and numbers injected into an aluminium base. The reverse shows four holes and a channel through which the plastic is injected.

Numbers by Injection

There appear to be great possibilities in this new process for more complicated decoration.

ON ADVERTISING PLASTICS

It was with considerable pleasure, on opening our *Punch* of November 17, that we discovered British Industrial Plastics, Ltd., had taken a page advertisement in order to help make the public "plastics conscious." This, we believe, is the first time plastics has been advertised in such a journal. We heartily congratulate the company on taking this bold step.

With the kind permission of *Punch* we are able to reproduce the page. The wording is as follows:—

"What is it . . . that's as thin as paper, or as thick as a railway sleeper; as clear as glass, or as dense as ebony; as elastic as rubber, or as tough as steel?

"What is it that is built up from elements in unbounded supply—from British coal, air and water?

"It's a mould-stuff that satisfies both the engineer's demand for strength and insulation in his instruments and controls, and the manufacturer's for compactness, pleasing touch and appearance in his products.

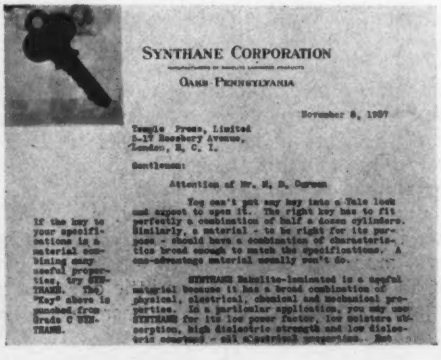
"It's a resin that provides the basis for a hard, heat-resisting finish for motorcars, refrigerators and many everyday things that require a durable and colour-fast exterior.

"It's a glue that is so tenacious that the joint is often stronger than the materials it joins.

"Only plastics can fulfil all these widely varied modern needs. . . ."

A NOVEL CIRCULAR LETTER

The Synthane Corporation, of Pennsylvania, have adopted a novel method of advertising their goods—Bakelite laminated products. Attached to the accompanying letter they have sent us is a small packet of transparent wrapping enclosing a key cut out of Bakelite laminated sheet. The advertisement itself is built round the word "key." Plastics certainly unlocks the doors of most industrial problems.


SYNTHANE CORPORATION
OAKS · PENNSYLVANIA
November 8, 1937
Temple Press, Limited
9-17 Rosebery Avenue,
London, E. C. 1.
Gentlemen:
Attention of Mr. H. S. Darwen
You can't get any key into a Yale lock and expect to open it. The right key has to fit perfectly a combination of half a dozen cylinders. Similarly, a material - to be right for its purpose - should have a combination of characteristics broad enough to match the specifications. A one-advantage material usually won't do.
If the key to your specifications is a material combining many useful properties, try SYNTHANE. The "Key" above is machined from Grade C SYNTHANE.
SYNTHANE Bakelite-laminated is a useful material because it has a broad combination of physical, electrical, chemical and mechanical properties. In a particular application, you may use SYNTHANE for its low power factor, low moisture absorption, high dielectric strength and low dielectric constant - all electrical properties. But

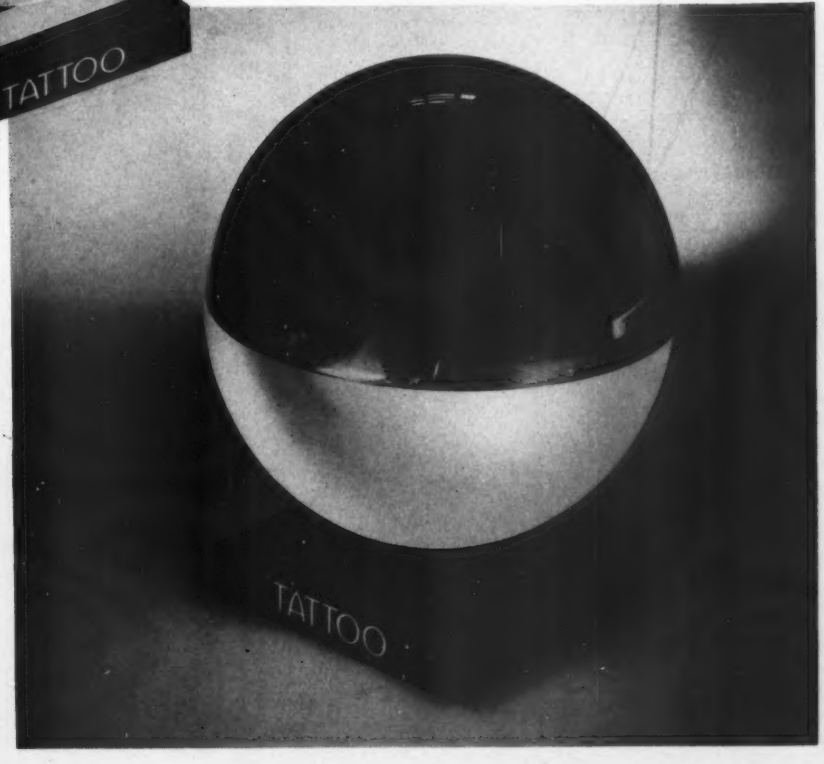
The Silent Salesman

"TRY it out before you buy." This is the new slogan of several progressive firms who have found a new and successful way of helping prospective customers to make a decision in favour of their goods. Here are two examples: Fassett and Johnson, Ltd., supply their retailers with a specially designed Tattoo Lipstick Selector, which contains all the available shades of lipstick now in demand by the modern woman.

The chemist or hairdresser has one of these Selectors displayed in a prominent position on his counter, with the result that Madam is curious to know all about it, and, what is still more important, she is encouraged to see if her favourite colour is available by rubbing a little of the lipstick on the back of her hand, the stain being easily removed afterwards by a special solution and a wad of absorbent wool.

In the construction of this Selector, known as the Dome type, plastics have contributed a great deal towards its attractiveness and utility. A director of Fassett and Johnson, Ltd., says: "There is no doubt that this method of auto-demonstration is not only popular, but highly conducive to sales, and, further, may we add that, in our opinion, plastic material will play a still more prominent part, particularly with this type of display goods."

The second example of a really first-class silent salesman is afforded by the well-known firm of Evered and Co., Ltd., Smethwick, Staffs, who find that the sales of their streamlined moulded door bell, marketed under the name of "Silvertone," are given a decided impetus by means of the one illustrated. This is mounted on



The Dome type of Tattoo Lipstick Selector is both attractive and practical. The base is of phenol formaldehyde resin and the container moulded of pink plastic material.

a block of wood and supported at the back, so that it will stand firmly on the hardware merchant's counter.

The idea of a silent salesman is capable of considerable development and should prove of great benefit to the plastics industry, which can contribute to its ultimate success and usefulness. Here are a few haphazard ideas applicable to several popular lines:—

1. The manufacturer of quality vanishing and cold creams might evolve some simple, but modernistic, stand provided with a series of ejectors, which, on pressing corresponding buttons, would squeeze out just sufficient face cream for a woman to test its perfume and reaction to the skin.

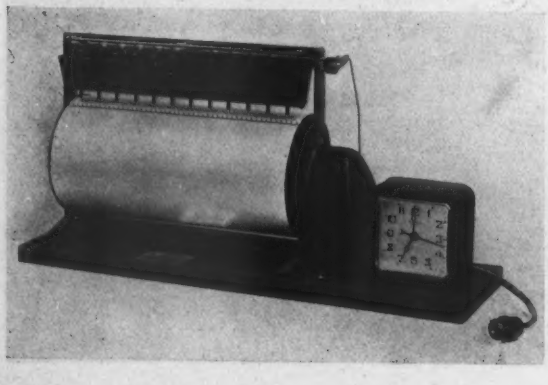
2. The Postmaster-General might consider the advisability of a silent salesman for the post office savings bank, which could be prominently displayed on every post office counter. The essential feature of this, and it might easily be made of plastics, would consist of an indicator board showing the ultimate results of various thrift plans. An alternative would be some simple form of calculating machine able to give the capital and interest obtained by depositing a regular weekly or monthly sum. The same idea could be adapted for banks and even insurance companies.

It does not require a great imagination to be able to develop the silent-salesman idea on any particular lines, and there is no doubt that the plastics industry would benefit very considerably from their more widespread use.

Moulded of Everite by Evered and Co., Ltd., the "Silvertone" door bell is already in good demand.

NEW USE FOR BAKELITE MICARTA

Since micarta strip is unattacked by solvents, a new use has been found for it in a new instrument devised for testing the drying time of paints, varnishes and drying oils. The strips are coated with the oil and are fixed on the drum of the instrument. A dozen may be tested at the same time. As the drum slowly revolves small quantities of sand fall on to the oiled surface. While the oil is wet the sand sticks firmly, but when the oil has dried the sand no longer adheres, but falls off. It is then easy to estimate the drying time by measuring the length of the sand track. The micarta strips can be cleaned and re-used indefinitely.



(Top) The micarta strips of resin-impregnated paper used for the drying test.

(Left) The "Drying Time" Testing Machine for the paint industry.

THE products shown illustrate only a small fraction of the many applications for which Catalin is suitable. Whether used for objects of utility, art or decoration, this—the most beautiful of all plastics — produces character, personality and distinct sales appeal.

Catalin is an ideal material for industry as well as for the craftsman. No heavy investment for special tools, machinery or presses is required.

May we plan with you?

Catalin

TRADE MARK

CATALIN LIMITED

3, Vere Street, London, W.1

CAST RESIN, the new plastic material, is the basis of these Permastand display sets, which are made in any combination of five attractive colours—Black Onyx, Alabaster, Turquoise, Jade, Chinese Lacquer Red. The sets are permanent, washable, difficult to break, unaffected by spirits, yet inexpensive and give you the opportunity of using to the full your creative ingenuity.

Displays at Exhibitions, on Counters, in Shop Windows become more interesting, more attractive and more effective with this new system.

PERMASTAND
MULTI - DISPLAY SYSTEM

If you are interested, please write, marking your envelope "D," and we shall be pleased to send you further information.

PERMASTIC LIMITED
WOODHAM WORKS, NEW HAW, WEYBRIDGE, SURREY Telephone: BYFLEET 603

TWENTY MILLION TOYS

Plastic decorations for the Christmas tree are unusually attractive and colourful this year.

This Bandalasta tea-time set will keep the kiddies happy and quiet whilst father has a nap.

A MATHEMATICALLY minded friend has told us that if all the British toys to be given away this Christmas were laid end to end, they would make a line over 1,800 miles long. How he arrives at this distance we do not know, but what we do know is that 20,000,000 British toys is a very creditable performance for home manufacturers. Fifteen years ago the proportion of British toys was only one in ten; to-day it is six out of ten.

Although wood and metal are still the most popular materials of construction, rubber is widely used and the 1936 toy census shows that over 2,000,000 rubber animals and toys and some 3,000,000 rubber balls were sold. There is no record of the number of plastic toys and games, but this must be very considerable, and the tendency is for it to be multiplied as these new materials make a ready appeal to both the general public and retailers. They are attractively designed, strong, smoothly finished and colourful, and unlike painted or enamelled wood or metal toys, they do not chip or loose their smart appearance. This is very important, as many shopkeepers find that a large number of toys soon lose their freshness, especially when they have been handled a lot by prospective buyers.

Cellulose acetate is one of the most popular plastics for toys and many of the smaller ones are made entirely of this material by injection moulding. A large number are, of course, made of acetate in conjunction with other non-plastic materials. For instance, dolls' houses are fitted with Rhodoid windows, and miniature motor-cars of all descriptions frequently have non-inflammable celluloid windscreens. These are just two haphazard uses and a visit to any of the large stores will reveal a dozen or so more.

Bakelite and amino resins are also widely used for moulding a large variety of dolls' tea sets and furniture as well as all kinds of modern games. The spirit of modern times enters into the making of 1937 toys and children are no longer satisfied with clumsy imitations, they want accurate models. An excellent example of the plastic model is the flying boat made by Britains, Ltd., the hull of which is a Bakelite moulding produced by G.M.C. Mouldings, Ltd. This would certainly be a most welcome gift for any boy, anywhere and anytime.

The Playtime Tea Set, made of Bandalasta by

Brookes and Adams, Ltd., is one of the best examples we have yet seen of mouldings for the kiddies. The colouring is very attractive, the material non-fragile and the fact that every piece is interchangeable is an important sales argument, as in the event of accidental damage or loss the set does not become useless.

Ingenious and popular games made by the same firm include an entirely new one known as Whizzy Golf. This is most fascinating and suitable for both children and parents. It is played on a self-contained Bakelite moulded board and there are no loose parts to get mislaid. Then for grown-ups and kiddies there are carpet bowls, bagatelle, table golf and table skittles, all moulded of the same plastic material.

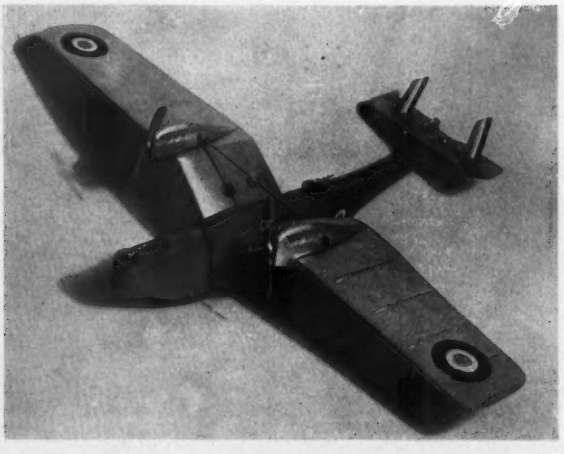
The new darts made of cellulose acetate by the British Xylonite Co., Ltd., should make a very wide appeal as they are easier to hold, more accurate to throw and a good deal stronger than wood. These are the more obvious advantages, but no doubt dart enthusiasts, and they number many thousands, will find other arguments in their favour. The British Xylonite Co., Ltd., also mould a wide range of kiddies' meal time sets, toy town furniture and other attractions for the Christmas stocking, as well as a fine range of non-inflammable plastic dolls.

Most boys like torches, and Bakelite mouldings are being used in the construction of a good many of these; some of the best examples we have yet seen are made by Stadium, Ltd. The batteries last longer in these new holders because the moulded cases will not corrode and the material is non-conductive. The cases do not dent or discolour and they retain their smart appearance indefinitely. The specially designed rubber buffer-top protects the glass and the bulb from shocks if the torch is accidentally dropped. For the cyclist, the same firm makes an excellent range of Bakelite cycle lamps at moderate prices which should certainly prove popular. There are also some novel but really practical Bakelite cycle horns.

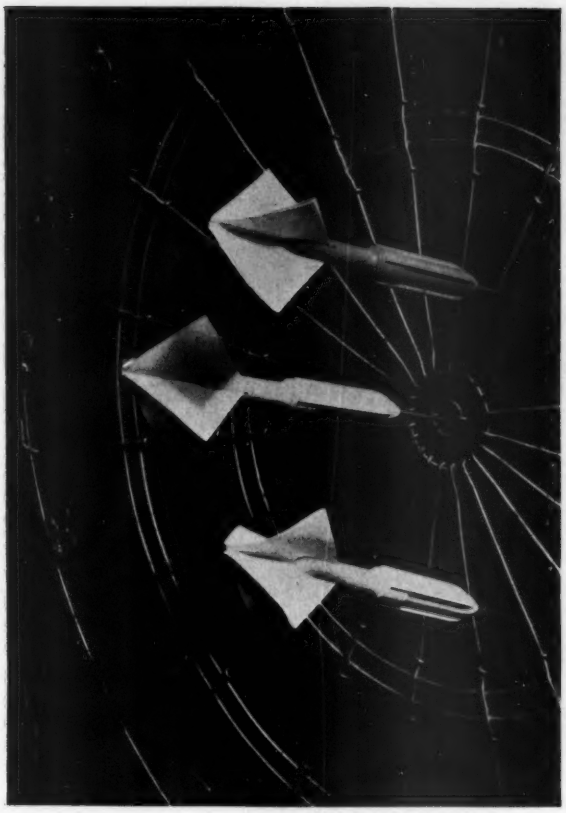
Father Christmas is to-day one of the plastic industry's best customers and advocates and he's rather proud of the fact. In an interview, which this genial old gentleman was kind enough to afford us just before he left his Arctic headquarters, he said: "Plastic material is ideal for toys and games and the new moulded ones not only look smart and fresh when they come out of my sack, but they never chip or get shabby

When the children have gone to bed, parents try their hand at the new games. Whizzy Golf is a great favourite this year.

Bakelite torches, equipped with rubber buffer tops, are definitely in the news this season.



This fine model of a flying boat is specially recommended by Father Christmas.



For young and old darts make a ready appeal and certainly the new plastic darts should sell like the proverbial hot cakes.

with use. Another important point in their favour is that they're not cold to the hand and so prove more comfortable in use and easier to handle. Then, of course, these new toys have no sharp edges like those made of metal, so cannot cut or scratch the hands."

The reindeer were getting impatient outside and Father Christmas began to make preparations for his long journey south. We helped him on with his huge fur coat and were pleasantly surprised to notice that it was fitted with one of the latest plastic zipp fasteners—who says Father Christmas is not up to date?

Ask to see plastic goods; talk about them, but, above all, buy them.

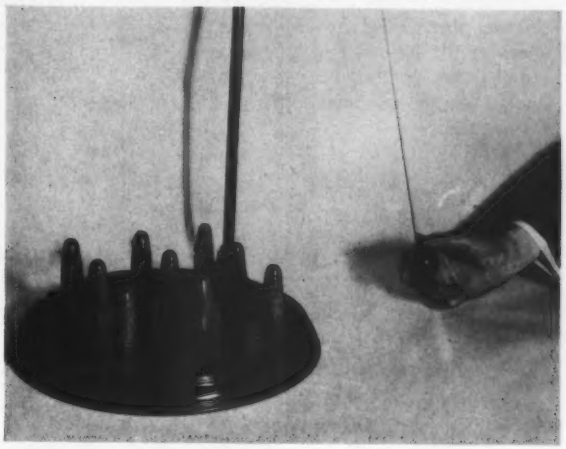


Table skittles has always been a popular game and the latest type made of plastics is a best seller.

For a Gentleman's Christmas

Four attractive dress accessories for smart occasions.

As in previous years, Hickok Manufacturing Co., U.S.A., has created an unusually attractive line of special holiday gift packages for men. There are belts and buckles, studs and cuff links, conveniently packaged in colourful dual-use containers of lustrous Bakelite moulded. These packages will serve later as cigarette boxes, ashtrays and jewellery and notion boxes. The lid of one package, in particular, contains the embossed head of a rampant horse. This package is being offered in finishes of Circassian walnut, gilt and bronze. Also from the States comes the new Shav Pak, a specially designed Bakelite moulded container of Mansfield shaving soap. The container's stippled outer surface assures a firm grip whether hands are wet or dry. In addition, the use of rich brown moulded Bakelite simulates the pleasing effect of grained leather. Shav Pak is moulded by Niagara Insul-Bake Speciality Company.

Excellent sales of these new dress and toilet accessories are reported, and no doubt they will prove a complete answer to that vexed question, "What shall I buy him?"

Paper Mills Save with Laminated Plastics

By

*F. Parke Mattison and †C. Eugene Center

LAMINATED resinous material of the plastics family has constantly been finding new applications. Actual experiences of the Rumford, Maine, mill of the Continental Paper and Bag Corporation (now owned and operated by Oxford Paper Co.), with the more common applications of this versatile material in the form of doctor blades, gears and bearings, may be of value to other mills.

Thin Doctor Blades Best

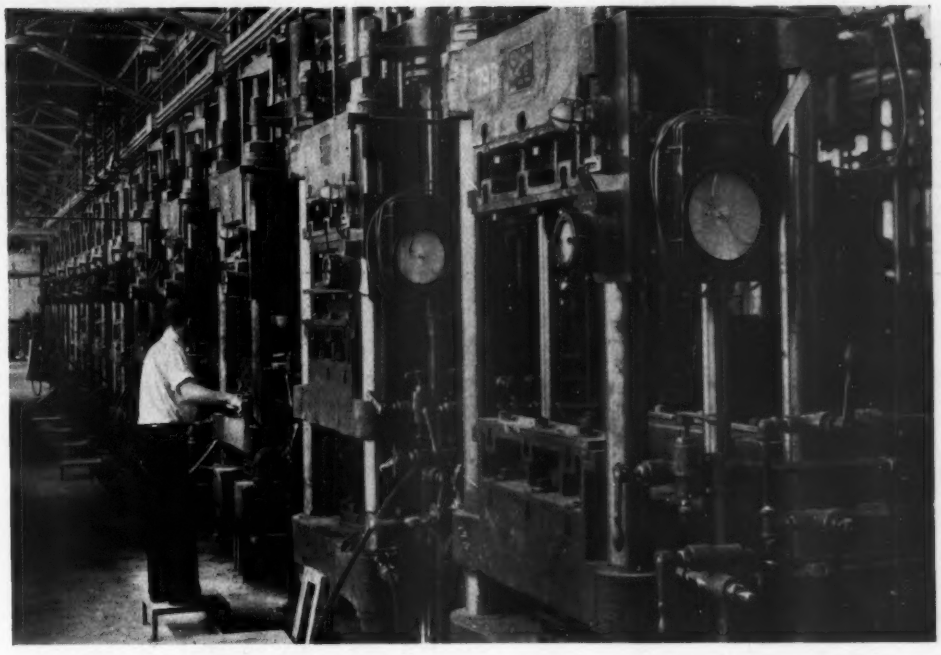
Doctor blades have been used for about five years on wet rolls, replacing wooden and metallic blades; none has been replaced as yet. Although some mills use bevelled Micarta blades in thicknesses of $\frac{3}{16}$ in. and $\frac{1}{8}$ in. and widths up to 7 ins. or 8 ins., this mill, after using some of this type, has learned that blades as thin as 3/32 in. and 2 ins. or 3 ins. wide are more satisfactory for its machines and grades of paper. They can be fitted to the roll more easily and their flexibility insures better cleaning action with less pressure applied.

A pressure of $\frac{1}{2}$ lb. per in. of length is applied to these thin blades by means of a properly balanced floating-type blade holder. Counterweights are best applied by means of steel or iron strapping distributed along the back edge of the holder, rather than weights hung on arms at the ends, since with the latter method springing of the holder diminishes the pressure at the centre of the roll. Thin blades are left perfectly free to adjust themselves in the holder and to the roll. To prevent binding, the space between backing strips is

Moulding a 27-inch-diameter roll neck Micarta bearing.

* Formerly Mech. Supt., Continental Paper and Bag Corp., Rumford, Maine, and now connected with the Oxford Paper Co.

† Industrial Division, Westinghouse Elec. and Mfg. Co., Portland, Maine.



Making laminated plastic plates requires unit pressures up to 300 pounds per sq. inch and temperatures up to 200°C.

made several thousandths wider than the blade thickness. One mounting hole through one end of the laminated strip and a slot at the other end allow for longitudinal expansion or contraction. On very long blades another slot in the middle may be desirable. These thin blades are not bevelled.

Compared to wooden blades, laminated plastic does not warp as much, nor check and crack under alternate wet and dry conditions. Water and pulp solutions are excellent lubricants, so it wears less rapidly than wood. It requires less complicated adjusting mechanisms than do metal blades and does not groove the roll. Micarta doctors have been applied in this mill to breast, couch and wire rolls. Although none has as yet been used on calender and dryer rolls, they have recently been put on rubber-top press rolls with good results.

Gears Wear Longer

Special Micarta gear stock is kept on hand in plate form of various thicknesses and gears for many uses are cut in the mill's machine shop. Installation costs are on a par with cast-iron or cut-steel gears; although the material is a little more expensive, the ease of machining is greater. Used on pumps, winders and various other machines, it is found that the life exceeds that of untreated steel, bronze or cast-iron gears where shock loads or vibration result in tooth breakage of these types. Lack of noise and reduced lubrication expense are also important advantages. The low coefficient of friction when mating with a metallic gear makes for high efficiency. Shrouds or end plates are not required as the method of manufacturing Micarta prevents the laminations from opening up under wet conditions.

Synthetic Bearings Outlast Metal

The use of laminated plastics for bearings in the paper mill is one of its most important applications and seems to be limited only by the ingenuity of the mill man in locations where water can be used as a lubricant.

The material is available in two forms and several grades for various purposes. For the small bearings and light loads of table rolls, wire rolls, wire guides, savealls, filters, etc., liners are cut from tubing. For the larger press roll, calender, beater and grinder bearings 180-in. segments, moulded to shape, are purchased. Thrust blocks, where required, are cut from plate and dowelled to the liner.

After considerable trouble with the frequent failure of the bronze bearings on the bottom roll of a second press section, bearings of this type were installed and the journals callipered. After six months of trouble-free service the roll was removed, journals callipered and the bearings inspected. There was no noticeable wear, and it was decided that this type was worth investigating further. First-press top and bottom rolls of one machine were then outfitted with plastic bearings with similar satisfactory results. Soon afterward a 10-in. I.D. by 29-in.-long bearing was put on a 54-in. six-pocket grinder, and another was installed on the bottom calender roll of a 96-in. paper machine. Both of these were watched carefully at first, but have given excellent results for over three years. Within the next year numerous table rolls, another grinder and two more press sections were completely outfitted. In the last case this material replaced anti-friction bearings with success.

The U-shaped bearings of a Nash wire guide on a machine running 900 f.p.m. were giving trouble. Replaced by a laminated bearing and receiving plenty of water by splash from the wire, these have shown no noticeable wear in over a year. One babbited grinder bearing had failed, and the shaft was badly scored and pitted. Replaced early in 1935 with a Micarta bearing and the shaft left untouched, recent examination showed that these rough spots had smoothed themselves out. Although irregularities were still present, the journal was remarkably smooth and the bearing presented a perfectly even surface. Former styles of plain bearings have not as yet had to be reverted to in any installation in this mill. This, however, does not make plastics foolproof, as proper installation is, of course, very important.

In general, clearances are slightly greater than customary with babbit or bronze bearings in order

Grinding laminated plastic material with ordinary metal working tools.

to admit the water and take care of the slight swelling due to moisture absorption (about 2.0 per cent. by weight after 24-hour immersion). In this mill clearances are $\frac{1}{16}$ in. total on bearings 10 ins. or over in diameter and 1/32 in. or 1/64 in. on smaller sizes, as compared to about 0.004-0.006 in. with babbit and 0.008-0.010 in. with bronze.

Plenty of water, acting both as lubricant and cooling medium, is flooded on the journal at the in-running side on segmental bearings. The top edges are liberally chamfered to act as a reservoir. Grooving of either the tubular or segmental types is not necessary. For tubular bearings on small rolls, the water is piped directly through a hole in the liner wall or else the liner is made in two cylindrical halves and the water introduced into the space about $\frac{1}{8}$ in. to $\frac{3}{16}$ in. wide between. Lubricating water for table rolls may be had by splash from the wire. If this is not sufficient at the end toward the couch roll, a shower pipe is installed with holes over the bearings. On machines or sections where wet conditions prevail no special provisions are made for the drainage or overflow and the water runs freely out the ends.

When a plastic bearing replaces the larger water-cooled oil-lubricated bearings the water goes out by means of ends or through slots to the existing water-cooling chambers and piping with only minor changes necessary. On calenders and other machines where it is desirable to keep water away from the roll itself, a grease seal is used at the roll neck. On press rolls the mill has successfully used a felt ring backed by a steel ring put on the shaft against the bearing with a press fit. When extended shut-downs of the machine occur a little grease or oil is applied to the journal to help in reducing starting friction. Ordinarily, however, the lubricating-water supply is not shut off at all; this continual flow also prevents rusting of the shaft during shut-down.

Because of this practice the mill employs no automatic controls on the water supply, although in some cases where it is preferable to shut off the water when the machine is idle it may be advisable to install a solenoid valve wired to the electrical drive, so that adequate lubricant will not be dependent upon human memory. No special provisions are made for filtering the water, as it is found that any grit or scale settling, in spite of the continuous flow and constant motion, will tend to embed itself in the Micarta and will not score the shaft.

In connection with calender bearings, it was found that during the winter water at 35 degrees or 40 degrees cooled the ends of the rolls too much, causing soft edges on the paper. By heating the water to 60 degrees or 70 degrees with steam this was easily remedied. Separate cooling chambers on large bearings are not used, as it is found that the properly adjusted flow of water to the bearing will keep the journal cooler than will the conventional type with oil.

Guide bearings for the vertical shafts of agitators are operating successfully, running submerged in stock solution. Recently a thrust bearing for a vertical water wheel was made out of laminated plate and is standing up well.

There are many methods of securing the non-metallic liner in the box, and each case can best be analysed separately so that the change-over can be made as simply as possible. Tubular bearings are held by setscrews or may simply be pressed into the chuck with a tight fit. In some cases, where wall thickness is large, the liner may be keyed. For the segmental types, the type of mounting developed for steel mill service, consisting of brass keeper strips bolted to the box and projecting over the longitudinal edge of the liner, has worked out advantageously. This mill has also used a modification of this by welding small blocks of steel to the keeper and seating these into slots cut in the edge, or in some cases the outside cylindrical surface, of the liner. This prevents both longitudinal and rotational movement of the liner. In some locations where space does not allow for this type, the liner is held by deeply countersunk flat-head screws from the inside of the bearing.

Although direct power measurements are hard to make on individual rolls of lineshaft-drive paper machines, close approximations on the larger rolls and on such individual machines as grinders, etc., show that large journals equipped with laminated bearings require less power than do those with plain bearings. On the installation where roller bearings were replaced power consumptions were about equal. Theoretically, such results would indicate that speeds and production could, therefore, be increased, but it is found that other factors in operating the machine limit the realization of such an advantage.

One of the principal savings is made in reduced maintenance and lubrication expense. On one set of $6\frac{3}{8}$-in. I.D. bearings the rebabbiting cost, frequently incurred, was about $75.00, while non-metallic bearings were installed at a cost of approximately $20.00, thus representing a worthwhile investment. In the case of calender and grinder bearings, it is found that the amount of lubricating water is less than the amount of cooling water previously used, and this difference, plus the complete elimination of lubricating oil, is thus clear operating profit. Longer life represents another item of saving.

Business on the Doorstep—

Made possible with Plastics

The Automaticket machine is easy to use, light and unobtrusive to carry.

THE collection of accounts by roundsmen is now rendered very simple and efficient by means of a comparatively new device known as the Portable Automaticket Machine. This is a box-shaped mechanism weighing, when fully loaded with tickets, about 3½ lb. and measuring 7½ ins. by 5½ ins. by 2 ins. The case is made of special reinforced Bakelite moulded by Kent Mouldings, Ltd., for the manufacturers, The Bell Punch Co., Ltd., London, and it not only possesses a smart, non-tarnishable surface, but is strong enough to ensure a long and serviceable life.

This new system of account collection by roundsmen, which is applicable to industrial assurance, certain types of instalment selling, milk, bread and laundry delivery, etc., is based on receipts. These are printed in continuous strip formation with the required particulars all ready for completion by the delivery man. Accompanying these are duplicates which are printed with the same serial numbers as the originals, both strips of receipts being folded together in zig-zag form and put up in packets of one thousand.

In actual practice the method of using the machine is extremely simple. On collection of an account the roundsman writes on the receipt form shown in the rectangular opening at the top of the machine. He then depresses a small lever, detaches the receipt, which he then sticks down on to the account book by means of the gummed back. The carbon copy of the receipt is passed into the duplicate receipt department of the machine when the man presses the lever.

One most important point stressed by the manufacturers is that the device is sealed so that the receipts are never accessible to the operator, who is thus protected against all suspicion, and the interests of the firm and customer are safeguarded at the same time.

The receipts are speedily extracted and analysed on special machines, of which there are two forms, the electrically operated combined analyser and adder, and the simpler and less-expensive machine, which merely projects the duplicate strip over a sighting position for quick reading and entry in the account books.

There is no doubt that this simple and accurate method of account collection is likely to make great headway in a number of trades, because it undoubtedly makes for quicker collection and greatly reduces clerical labour.

The growing popularity of the Automaticket machine is but another instance of the ready adaptability and excellent physical qualities of plastic mouldings. These now compete very actively with metal stampings on account of their lightness, pleasing and functional shape and, in consequence, manufacturers anxious to exploit a new idea are giving important and often prior consideration to the claims of Bakelite and other synthetic resins.

Close-up of the machine, open and shut.

The Menace of Noise

"With such accursed instruments as these,
Thou drownest Nature's sweet and kindly voices."
—Longfellow.

ALTHOUGH everyone knows the difference between sound and noise, it is extremely difficult to define noise except, perhaps, by classifying it as unwanted sound. C. H. Spurgeon once said, "Music is the sound which one's own children make as they romp through the house. Noise is the sound which other people's children make under the same circumstances."

A sound becomes a noise when it is unfamiliar, persistent or cannot be located. The 13th Annual Report of the Industrial Health Research Board states that "the stimulation of the ear by the noise which is met with in daily life is offensive or inoffensive—and affects the performance of manual and even mental tasks—according to its setting." "It isn't what he said, but the nasty way he said it," might be paraphrased to, "It isn't what he heard, but the nasty way he heard it."

Lord Horder, who is the chairman of the Anti-Noise League and one of our greatest authorities on the physiological aspects of noise, says that this menace wears down the human nervous system, so that both the natural resistance to disease and the natural power of recovery from disease are lowered.

In common language, noise makes us all irritable and "on edge," and so fritters away valuable energy we can ill afford to lose. True the law offers some redress if the noise becomes a nuisance at Common Law or if it offends against a Statute, but this is cold comfort and, in the vast majority of cases, offers no relief.

There are two practical ways whereby this stupid expenditure of nerve energy through noise can be prevented. The noise can be stopped at its source; that is, an organ grinder playing outside your bedroom window can be made to take "The Devil's Kitchen" farther down the road. Section 54 of the Metropolitan Police Act, 1839, states quite clearly that such offences may be punishable by fines of 40s. There are, however, a vast number of noises that cannot be stopped at source. It is, for instance, quite impossible to prevent road makers from tearing up the road in front of your house, and there is not the remotest chance of the railway company diverting the permanent way just because their expresses make the windows of your house rattle. The only remedy, therefore, is to prevent the unwanted sound waves from entering the building, and this is where the main problem lies, particularly as most

present-day building structures are excellent conductors of noise and vibration.

Dr. G. W. Kaye, of the National Physical Laboratory, reminds us that a hard-plastered wall is a better reflector of sound than most mirrors are of light; and that sound waves "bounce" about rooms in all directions until they are finally absorbed.

Among the materials most useful for sound insulation is rubber. Owing to its softness and resilience it can damp or deaden impact noises to a remarkable degree, and this is the reason why rubber floors are being laid in so many domestic and commercial buildings. Cellular or sponge rubber, on the other hand, possesses the peculiar property of absorbing noise. This is brought about by the cell-formation of the rubber which breaks up sound waves and so prevents the reflection of sound.

Apart from the use of rubber flooring, rubber contributes to the fight against noise in many ways. Rubber paving blocks are particularly suitable for roadways where the congestion of traffic leads to a considerable volume of noise. The Mersey Tunnel has about 2,000 yards of its roadway laid with rubber blocks, and not only is rubber used alone, but it is also being incorporated with bitumen, asphalt and other surfacing materials. It is significant that the City of London decided only a few weeks ago to pave Lombard Street with rubber, the frontagers, chiefly bankers, having expressed willingness to contribute towards the cost.

The replacement of iron-shod wheels with pneumatic tyres has resulted in a considerable diminution of street noises, and it is to be hoped that the use of these will become more universal. So far experiments with rubber horseshoes have been very promising, and the time should not now be far distant when local authorities make them compulsory for all early morning traffic. At the present time the milkman's cart may be silenced with rubber-tyred wheels, but his horse may be, and probably is, responsible for waking you up in the early hours of the morning.

Whilst on the subject of milk distributing, it is a fact that the introduction of rubber has been responsible for a number of improvements. Some of the more progressive dairies use churns provided with rubber buffers or tyres, and also rubber-covered metal milk bottle carriers, both of which greatly reduce that deafening clatter one always associates with milk trains. The Rubber Growers Association suggest that loading platforms at railway depots, milk-distributing yards, goods yards, etc., might very well be covered with rubber, or, alternatively, rubber mats fitted at strategic points would tend to accomplish the desired end.

In building construction, where definite attempts are made to provide noise-free conditions, rubber naturally plays an important part. Mr. Hope Bagenall, the well-known architect, advocates the more extensive use of rubber cushioning material. One method which he recommends is to provide an artificially loaded board and batten floor resting upon rubber pads and sufficiently compressing them so that they act as kind of shock absorbers and so provide a high degree of insulation against common impact noises.

Rubber flooring is being increasingly specified for modern buildings. A recent joint investigation carried out by the National Physical Laboratory and the Research Association of British Rubber Manufacturers demonstrated that rubber flooring also possesses definite sound-absorption properties; apparently the sound-absorption coefficient of rubber flooring lies between those of hard types of flooring and the carpet class. For this same reason, rubber sheeting is extensively used in hospitals and large commercial buildings for attaching to the walls of rooms where very quiet

Entrance to safe deposits vaults at the Midland Bank, Poultry, London, laid with IOCO rubber flooring.

A modern office in the City of London floored with Rigid Rubber Tiles. These are made of special reinforced rubber.

conditions have to be maintained. Besides ordinary vulcanized rubber, the sponge variety is also widely used, as well as many specially compounded compositions containing rubber mixed with asbestos fibres and other inert materials.

Transport authorities are gradually waking up to the fact that in many cases noise can be reduced both easily and economically. One of the latest experiments in this direction has been undertaken by the Sheffield Transport Department, who are trying out rubber staircases and rubber floors in their trams. Another modern use of rubber is for the silent passenger lift now so frequently installed in so many large commercial buildings. One of the best-known types is made by Hammond and Champness, Ltd. Besides a super-silent motor, this lift is equipped with a cage gate of special design with Bakelite track and rubber buffers, and all moving parts, such as switches, gate locks, etc., are rubber cushioned.

In modern industry there is a great need for anti-noise measures. Whilst it is impossible to silence every machine, a good deal can be done by the use of anti-vibro mats, such as those made by Sorbo, Ltd., and the Empire Rubber Co. These are generally cut from yellow sponge, with a solid rubber top on one side, and can be supplied in thicknesses from ¼ in. to 1½ ins.

For heavy machinery, ear-splitting noises can be mitigated to a great extent by the use of Antivibrators made by W. Christie and Grey, Ltd. These ingenious devices eliminate definitely the transmission of noise and vibration from the machinery into the structure of the building in which it is installed.

Apart from the commercial side of the noise problem —and rubber has certainly not been backward in making capital out of it—there is no question of doubt that the extensive use of rubber has resulted in a great diminution of noise. A great deal, however, still remains to be done, especially as so many of the amenities of modern life, such as the radio, can be nuisances to those who, unfortunately, have to listen to other people's programmes.

Rubber Concrete

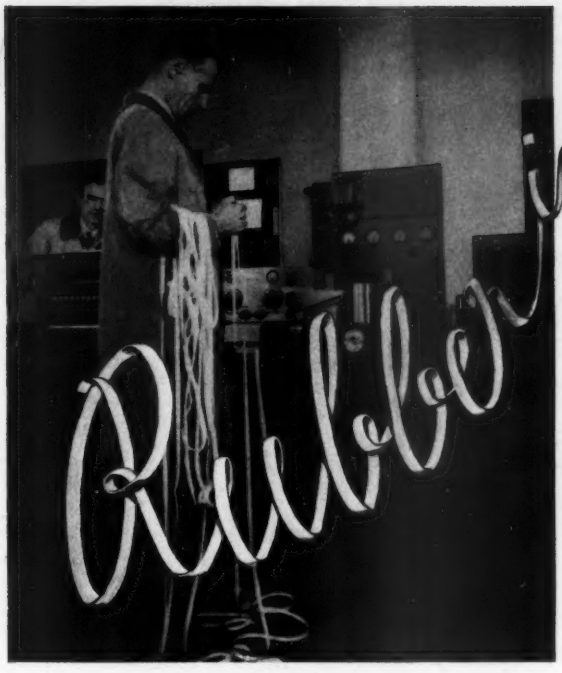
Numerous attempts have in the past been made to combine the properties of rubber and concrete, but without very much success. It is, therefore, interesting to note that a material called Ucrete, made by a well-known Yorkshire firm, claims to combine many of the most important advantages of rubber and concrete. It is waterproof; sets like cement and is not dependent on evaporation; in addition it is dustless and has good wearing, strong adhesive properties and can be moulded to form non-brittle shapes. F. Hulse and Co., Ltd., Woodlesford, Leeds, are the manufacturers.

Ucrete has already been tested out on a practical scale with success.

Plastics for American Footwear

According to a report from Chicago, the shoe industry in the United States is making good headway in the development of plastic materials for both manufacturing equipment and shoe construction.

One successful use is the substitution of handles for shoe trees. The thermo-setting material closely resembles red cedar, of which the toes of these trees are made. Last month a patent was granted on a moulding compound which can be moulded under pressure in a large variety of shapes, including shoe lasts, where certain qualities are desirable so that they will not disintegrate, crack or change shape when exposed to moisture.



Rubber Soap Wrapper

According to the American publication *Soap*, a very thin coating of rubber has been developed by J. P. Kane, of New York City (U.S. Patent No. 2,042,104), for use as soap wrappers. Used in place of the conventional paper wrappers, the sheer rubber coating is claimed to keep the soap waterproof and weatherproof. To unwrap the cake of soap, the rubber coating is simply stripped off by pulling at a tab on the side. The rubber wrappers can be coloured any desired hue.

The cakes of soap are sprayed with or dipped into an aqueous solution containing rubber, sulphur, zinc oxide and an ultra-rapid accelerator. Coated with this solution, cakes go into a drying chamber and then into a vulcanizing chamber. Because of the ultra-rapid accelerator, vulcanization takes place quickly and at low temperatures, so that the cake of soap is unaffected. In this way an adherent rubber coating is formed over the cake of soap, which fits its contours so snugly that trade marks and designs impressed in the soap appear very clearly and present an attractive package. The coating is permeable to the perfume of the soap.

Rubber Bearings

Increased uses are being found in various important industries for rubber bearings. Sidney A. Brazier and W. Holland-Bowyer, of the Dunlop Rubber Co., Ltd., in a paper recently read before the Institution of Mechanical Engineers, stated that "the advantage which rubber possesses in this way is considerably increased when the water used for lubrication contains grit or dirt. Owing to the ease with which the rubber is displaced and its resilience, the particle of grit does not lodge in the bearing, but is depressed into the rubber without cutting, and is then rolled by the rotation of the shaft into the adjacent groove and so washed away. In addition, owing to this deformation, the unit load on such particles approximates to that on the surrounding rubber, whereas on a hard-surface bearing the load can rise to a considerable value before it is forced into the bearing or shaft surface."

Rubber in the Coal Mine

From America comes word of the many uses now being found for the Du Pont rubber ducting known as "Ventube." This is used all over the world in coal mines and in tunnel driving. There has always existed a big demand for a flexible duct that could quickly be brought up to the working surface to dissipate dust and gases from drilling and blasting operations. The old-type rigid-material duct was not too satisfactory; it was bulky, hard to store and difficult to install. "Ventube," which is a new type of rubber-coated and impregnated fabric, offers a minimum of friction to the passage of air. It is quickly installed and as quickly removed from the working face. The material is not only immune to the corrosive attacks of acid and alkaline water, but fungus growths and other insidious influences.

The Du Pont rubber-fabric material is also used for brattice cloth in coal mines. It is employed underground to shut off old entries, so that when fresh air is pumped into mines for the use of the workers it will not be shunted uselessly up these abandoned passageways. A good brattice cloth must not only be long-lasting and proof against all exposures, but really fireproof. The Du Pont chemists claim that "Ventube" fulfils all these requirements.

Rubberized Tractors

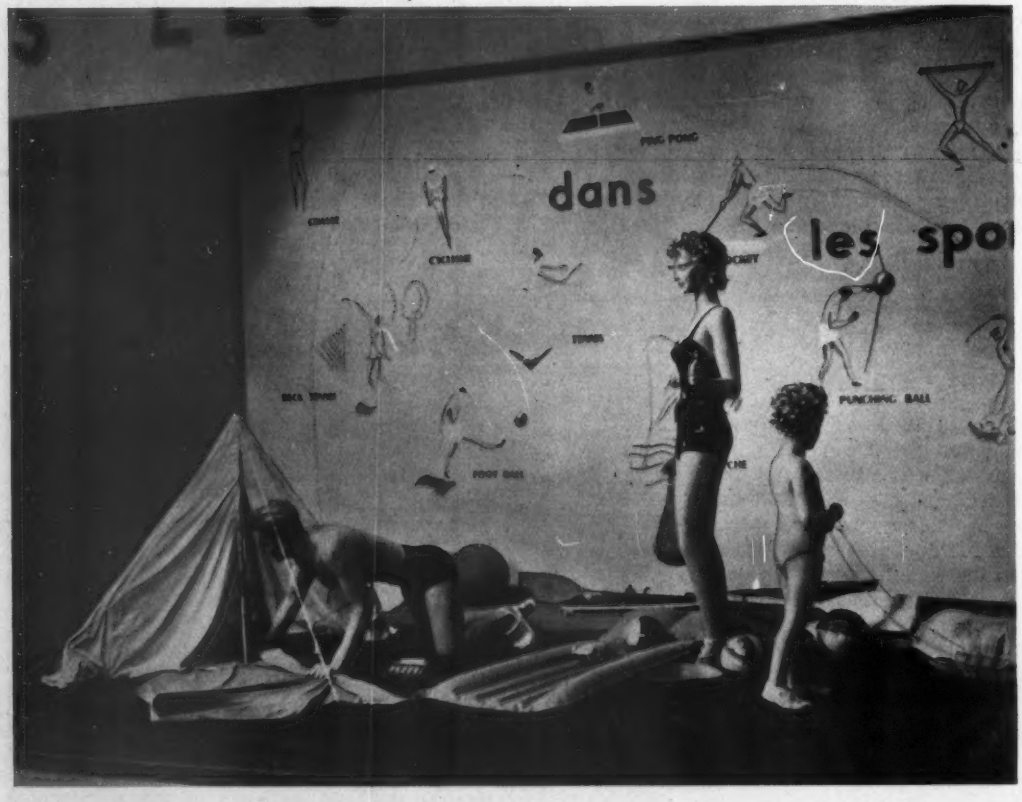
A new patented rubber track of the continuous-band type is now being used for the latest type of tractor, which was successfully demonstrated at Indianapolis a few weeks ago. Engineers responsible for the development of this so-called rubberized tractor claim that it enables power and fuel saving of 20 per cent. to 60 per cent., depending on the speed of operation. The machine can take gradients of 60 degrees, and yet brake easily when half-way up steep hills. In the streets it attains an average speed of 30 miles an hour.

The Visual Call Indicator

This can now be substituted for the customary telephone bell, so that attention is attracted without noise to incoming calls. The device comprises a neon lamp mounted in a weighted rubber moulding 4½ ins. high, also a length of connecting cord. Placed on the deck within view, repeated brilliant flashes announce the incoming calls. Hospitals are finding the indicator a great convenience and several are being installed in both London and the provinces. The Automatic Telephone and Electric Co., Ltd., are the manufacturers.

Striking Rubber Exhibit

The Paris Exhibition, which closed on November 25 with an award of prizes to exhibitors by M. Lebrun, President of the Republic, was visited by 33,500,000 people. According to officials, the rubber exhibits in the Pavillon des Caoutchoucs were very popular with foreign visitors, who made a large number of inquiries. One of the most attractive exhibits was the realistic all-rubber tableau illustrating the many uses which rubber finds in the realm of sport. The success of this display should encourage home manufacturers to evolve similar exhibits at the Empire Exhibition to be held in Glasgow next year.



This amusing and arresting stand in the Pavillon des Caoutchoucs at the Paris Exhibition was certainly the most outstanding in the Pavillon. It illustrated the multitude of uses now found for rubber in modern sport.

SOME NEW THERMO-PLASTIC MATERIALS

Mipolam, Astralon and Oppanol

PROBABLY the most interesting thermo-plastic material that has appeared in the plastics industry during the past few years is the polyvinyl-chloride type of material, which is sold under the two well-known trade names of Mipolam and Astralon. Both are produced basically from acetylene.

Dealing first with Mipolam, this is a thermo-plastic non-hardening, synthetic resinous compound, which is

Chairs made with Mipolam artificial "leather" covers.

used in a variety of industries, owing to its very remarkable properties. It is odourless, non-inflammable, virtually non-hygroscopic and is absolutely unaffected by animal, vegetable and mineral oils; is insoluble in alcohol and petrol hydrocarbons, but will swell in many other solvents such as benzene, etc. It is, however, proof against most acids and alkalies and, furthermore, possesses the useful property of being ozone proof.

Against all these virtues must be offset the fact that it is not heat resisting and is not capable of vulcanization.

The advantages, however, greatly outweigh the disadvantages, and as a replacement material for rubber in certain industries it is obviously ideal. Probably one of the most important applications is in the cable and insulated sleeving industries. The material can be extruded on standard rubber forcing machines with little or no alteration to the machine in question. In the case of the extrusion of thin wire covered with Mipolam speeds of take-off of 250 yds. per minute are attained commercially without any trouble. Furthermore, owing to the absence of sulphur, there is no need to tin the copper wire before covering, as is necessary in the case of rubber.

For the production of sleeving, this material lends itself peculiarly well in view of the fact that it can be produced in endless lengths of any colour, and in a tough and elastic form which does not crack when being bent.

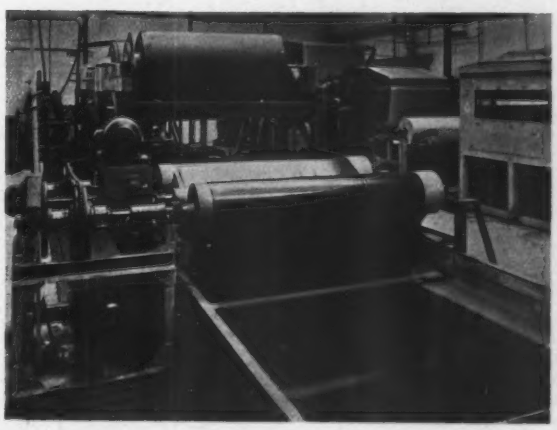
Its electrical properties are excellent, its breakdown voltage being in the neighbourhood of 25 KV/mm.

Owing to its remarkable resistance to oils in general, the application of Mipolam for covering wires as an insulator in the presence of oil is a very important one. Furthermore, where it is essential to enclose oil in flexible or semi-flexible conductors, the use of Mipolam would obviously be very desirable.

Owing to the fact that it can be produced in any colour from transparent to black, the use of Mipolam covered wires on complicated wiring systems, particularly where non-inflammability is desirable, is most important, as it dispenses with unnecessary and elaborate cotton braiding in different colours.

Passing now to the use of Mipolam for moulding purposes, its excellent electrical properties, its flexibility and its oil and acid resistance again allow of its use in many industrial fields. For example, it is being used in large quantities for producing accumulator cases, washers and U-packing rings.

There is a special grade of material supplied in tube form which has a higher heat resistance than the ordinary types of Mipolam, and tubes so produced are used for conveying chemical and corrosive liquids



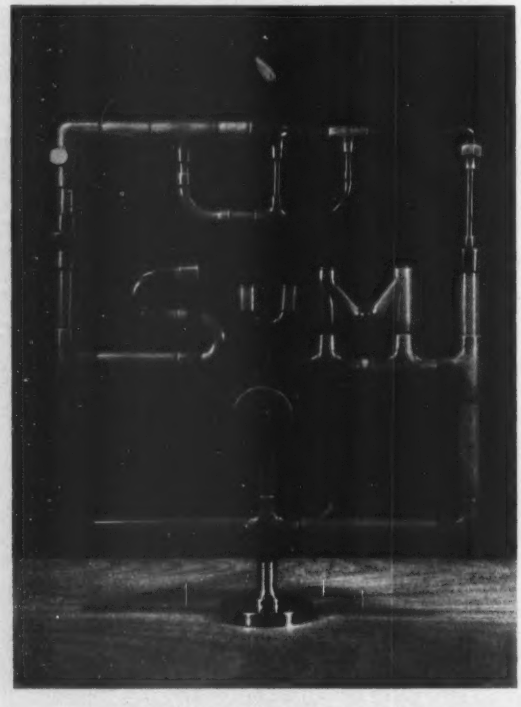
Mipolam in factory plant. The rollers, which are in contact with sulphuric acid, are covered with Mipolam sheet.

generally with absolute success. These tubes can be bent, shaped and joined by means of flanges or sweated together.

It is claimed that the cheaper type of artificial leather has certain disadvantages in so far as it smells and is not always comfortable to sit on. The new artificial leather made from this material is a vastly superior product, and chairs and motorcars, as exhibited at Düsseldorf Fair, are now being upholstered in this material.

It can be easily seen from the above brief outline that the properties of this material will permit of its use in many directions which have so far not been commercially explored. One can visualize its use for the covering of threads for decorative and anti-corrosive purposes, where varnishing or impregnation at the moment give only an insufficient protection. It could with advantage be used for collapsible or semi-collapsible containers, owing to its flexible, non-toxic, odourless and airtight properties.

Where vibrationless, oil-proof or other liquid-proof mountings are required for engines, blocks of this material would obviously be very suitable.

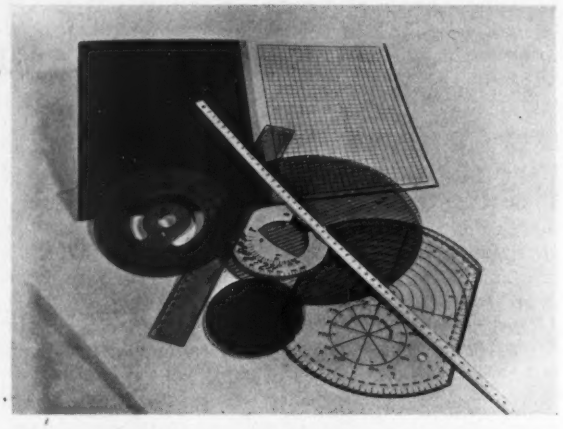


The tube connections are of Mipolam.

Astralon is the trade name for the same material supplied in sheets, rods and tubes, in all colours. In sheet form this material has immediately found a tremendous outlet, as it has all the properties of celluloid regarding transparency, colour range, etc., without the disadvantages of inflammability. Furthermore, being absolutely non-hygroscopic and having no tendency to become brittle with age, it makes it of great interest to those industries where these points have always been a deterrent. In addition, it has been found that the technique of printing on celluloid can be used for printing on Astralon.

Astralon may be stamped, cut, bored, sawn, drawn and generally treated in exactly the same manner as the other thermo-plastic sheet, rod and tube materials.

Oppanol B. is the still newer material which is more akin to synthetic rubber than Mipolam or Astralon, in so far as it has an extremely high molecular weight (two grades being supplied, known as



Transparent, non-hygroscopic Astralon makes excellent drawing instruments.

Oppanol B. 100 and Oppanol B. 200, the molecular weight of the first being 100,000 and the second 200,000), and the material in lump form appears to the unpractised eye to be nothing more or less than a lump of crêpe rubber.

Oppanol B. can be extruded at a high speed on to wires at a temperature of about 225 degrees C. It maintains its elasticity within a temperature range of minus 50 degrees C. to over plus 100 degrees C. This new compound is:—

Non-hygroscopic.

Resistant to dilute and most concentrated acids and alkalies with the exception of concentrated nitric acid, which affects it slightly.

It is unaffected by methanol, ethanol, butanol and acetone, but is liable to swell in ether and butyl acetate.

Resistant to ozone.

Oppanol B. is soluble in benzene, benzol, mineral oil and carbon disulphide.

The electrical properties are unaltered after 24 hours' immersion in water.

Incorporation With Rubber

Oppanol B. can be incorporated with rubber on steam-heated rollers in the proportion of 25 per cent. or more. Rolling temperature should be about 180 degrees C., and the addition of one part to nine by weight of special waxes or resins to the Oppanol will facilitate working and give better elasticity.

It has been found that the ageing properties and low loss figures of rubber are considerably improved by the addition of Oppanol B.

Extrusion temperatures of the resultant mix will be correspondingly altered, according to the amount of rubber that has been used in the mixture.

The sole selling agents of these new materials are F. A. Hughes and Co., Ltd., Abbey House, Baker Street, London, W.

PRODUCTION

Practical Information dealing with Raw Materials, Moulding and Forming of all types of Plastics—Thermo-Hardening and Thermo-Plastic—Works-Organization, New Plant and Control Apparatus

NOTES AND COMMENTS

A New High-strength Moulding Material

THE introduction of synthetic resins, especially those of the phenol-formaldehyde type, created its greatest impression on the electrical and allied industries where their properties of high electrical insulation, great strength and mouldability made them unique.

As raw materials, mechanical engineering science also soon saw their possibilities, and a material with even greater strength—compressed laminated sheet—soon found a ready outlet, and to-day we have very heavy-duty components, such as gear wheels, truck wheels and bearing surfaces, which possess considerable superiority over metal components, replacing them in many applications.

To-day we have to record yet another important step forward in plastics production towards what may be called an ideal.

We have in past issues given an inkling of a new moulding material with extremely high mechanical properties made by impregnating fibrous fillers such as cellulose fluff and linters when in a felt-like condition. It is produced for the market in two forms, one a flock-like material and another in sheet form. Both forms are mouldable, the sheet form being especially interesting since no sign of lamination is observed in the finished moulded form, nor is it possible to separate laminations. One homogeneous whole is produced.

Extraordinary high test figures (especially noteworthy are the impact strength and Young's modulus) are claimed by the manufacturers.

Impact Strength... ...	25 cm./kg./cm.^{2}
Tensile Strength... ...	17,000 lb./sq. in.
Compressive Strength ...	25,000 lb./sq. in.
Young's Modulus (approx.)	1,500,000/2,000,000 lb./sq. in.
Specific Gravity	1.38 to 1.42
Water Absorption (immersion for 24 hours.)	0.3 to 0.8
Heat Resistance (Martens)	186° C.

The low water absorption will be particularly attractive for many applications.

Perhaps most important to mechanical engineering is the very fact that such a material can be moulded, for the obvious leaps to the mind—we can now produce a toothed gear wheel of sufficient strength by moulding, whereas the gear wheel constructed normally from laminations must be cut by tools. Indeed, we understand that at least one firm is turning out such gear wheels at a rate never hitherto accomplished.

The new plastics are known as P.T. moulding materials and are the discovery of Dr. Kurt Albert. We presume that this is the same Dr. Albert who first introduced the well-known oil-modified synthetic resins, known as Albertols, for the paint and varnish industry. Since there is a large factory at Erith already producing Albertols, we presume it will not be long before P.T. is made in this country.

At an exhibition at the Hotel Great Central last month, United Insulator Co., Ltd., who are the sole selling agents, showed some remarkable specimens of finished goods made from P.T. These included moulded gear wheels, a fractional horse-power motor casing complete, an electric hair-drier body, a moulded junction box and other items. Especially noteworthy were square plates and blocks which were shown riveted and nailed without any sign of splitting. The material can be machined, screwed, tapped and even cold punched up to $\frac{1}{8}$ in. The electrical properties are stated to be equal to the better grades of normal phenol resin materials.

There seems little doubt that we have here an important material for construction. Already we hear that several moulding firms are producing finished goods, although they are not talked about over-much. But we can at last see the imprint of moulded plastics in spheres where properties such as high impact strength and Young's modulus, etc., are so important—in aircraft and engineering generally. Who knows, we may now see the moulded motorcar door—and more.

Carbide Manufacture in Great Britain

IT appears quite definite now that, as we indicated in our September issue, two carbide factories are to be established very quickly, one in South Wales at Port Talbot, the other in Scotland at Corpach in the Western Highlands. Necessary powers to allow the British Oxygen Company's scheme will be obtained by the passage of a Bill through Parliament.

The whole scheme is more than of passing interest for it has been developed for a variety of cogent reasons, economical and political. The two factories will produce carbide from coal and lime, using, in South Wales, coal, and in Scotland, water power, to produce the electricity needed for the high temperature electric furnaces. The authorities had in mind primarily, when considering

the matter, the worthy object of helping the distressed areas to reduce unemployment. South Wales and Scotland are both obvious situations for such factories in any event.

Another important factor that influenced the authorities in considering whether or no carbide should be made at all is the fact that carbide is an essential raw material for heavy engineering, the use of which must not be seriously impeded in time of stress, such as war. Welding and metal cutting has become such a tremendous industry that it must be safeguarded.

Normally, we should say it was rather stupid to manufacture carbide here, for we cannot quite imagine what sort of world it would be if every country made everything it needed within its own frontiers. Far better is it for countries like Canada and Norway to manufacture carbide for the world. But times are exceptional and we do not quarrel with the desire to safeguard ourselves.

There is also one aspect of the case which we think has not yet been considered. This aspect deals with chemical research. It appears, on the surface, at any rate, that if a country has to import a material, the tendency is not to carry out research work on that material. The country that manufactures a material does generally carry out research work on it. This is by no means always true, but we think it is generally so. The reason is, of course, partly economic, but also it is due to the availability of raw material at the factory, where chemists are present. They are more or less completely absent in the engineering industries that use the products. Dealing with carbide and acetylene, it is the countries where these materials are produced that have made most of them and have made new chemicals.

Acetylene is the raw material for a host of important chemicals, the best example being acetic acid employed for making cellulose acetate sheet or silk. Enormous quantities are produced synthetically from carbide in Canada. Similarly the research work on many synthetic resins from acetylene was first carried out in Canada, Germany, France and elsewhere.

Here, then, we see where carbide manufacture impinges on the plastics industry, and why there is yet another good reason for carbide production. True it is that acetic acid is made synthetically and efficiently in this country from alcohol, but acetylene cannot be made economically from anything but carbide. And from acetylene the possibilities are alluring. We have first synthetic rubber of the Neoprene (American) type and the Buna (German) type, both of which start with acetylene as a raw material. Then there is also a large number of other plastics soft or hard, elastic or non-elastic at will, such as those known as the vinyl resins. These again, have originated in Canada or America or Germany, where easy access by chemists to the raw material has encouraged research.

As we go to press, we read of a patent on the production of a new plastic from ethylene gas by treatment under very high pressure. This work, which is by a British firm, appears to support our arguments.

It is for such reasons that we welcome carbide manufacture here.

Obviously, we think, the authorities did not consider the plastics industry as a potential user in their scheme; it was based solely upon the needs of welding and metal cutting. It is, however, more comforting to feel that if and when our vinyl resin and our synthetic rubber plants are installed, there will at any rate be a potential source of raw material on our doorsteps.

Denture Plastics

An interesting paper on the above subject was read at a recent meeting of the Plastics Group of the Society of Chemical Industry, by Mr. R. N. Johnson, M.Sc.

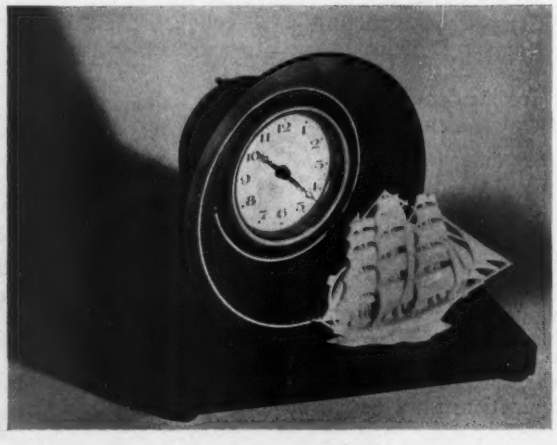
The author gave a valuable historical account of the materials used in the early days of the dental prosthetic art—horn, metals, porcelain, tortoiseshell, vulcanite and celluloid. In 1924 researches were undertaken by the Department of Scientific and Industrial Research with the object of producing a substitute for vulcanite. It was this work that resulted in the production of a phenol-formaldehyde resin, which provided a very attractive material. Since that date the number of plastics employed in this industry has increased steadily and to-day there are also in use plastics made from the vinyl and acrylic type of resins. Mr. Johnson then described the mechanical construction of a denture set and the important factors that govern the life of the material, ability to resist fracture, to retain its form and to remain hygienic.

The denture must be light for comfort, a property possessed by all plastics, and although they differ in strength, they are all sufficiently strong to resist fracture during mastication, at least in the early life of the denture. Fractures are seldom caused by mastication stresses, and more often during rough handling in cleaning. High cross-break strength, impact strength and resistance to fatigue are desirable.

Of the materials under consideration, those which have the highest impact strength are the most liable to undergo deformation, while the inferior in strength do not undergo permanent deformation. Brittleness, however, can be reduced in the latter case by the introduction of plasticizers.

CLOCK DESIGN

In our last issue, Mr. Eric Palmer, in his article on "Plastics and Design," asked, "How many moulded clock cases are there on the market which are not almost exact replicas of their wooden prototypes?" The joke is that most modern clock movements do not require such a housing, for the majority are already housed in a dust-tight metal cover. Mr. J. P. Garnell, of Inlay Mouldings, Ltd., has sent us a clock of his own design in answer to Mr. Palmer's remarks. The movement is not here housed in a secondary housing, while the design is concentrated on the facia and is certainly no copy of the conventional clock. It was on sale last Christmas.



CHLORINATED RUBBER PLASTICS

CHLORINATED rubber has become so important a material for paint manufacture, where its special film-forming properties make it extremely valuable, that its examination as a moulding plastic was inevitable. Nearly all the original work on this modified rubber was carried out in this country, and in 1846 the first patent was taken out.

The modern chlorinated rubber was placed on the market in 1934 by Imperial Chemical Industries under the name of Alloprene, and by 1935 other countries followed suit, Tornesit, Tegofam and Pergut being other well-known trade names for similar materials.

In a recent paper before the Plastics Section of the Society of Chemical Industry, J. P. Baxter and J. G. Moore gave some interesting data regarding the properties of chlorinated rubber and of its suitability as a thermo-plastic material.

Film-forming Properties

Suitably plasticized, chlorinated rubber forms films of satisfactory transparency and tensile strength by evaporation from common solvents. With plasticizers used to the extent of 25 per cent. of the film, chlorinated rubber films of approximately 0.001 in. thickness showed tensile strengths ranging from 3,700 lb./sq. in. with tricresyl phosphate as plasticizer, to 1,600 lb./sq. in. with amyl stearate. Tests of permittivity and power factor at a million cycles carried out on films containing varying percentages of plasticizer have shown that it is possible to prepare chlorinated rubber lacquers with excellent insulating properties, which, with their flame and chemical resistance, suggest many outlets in the electrical industry.

General Stability Data

Chlorinated rubber is, on the whole, a highly stable substance. It can, however, show three types of instability dependent upon (1) the presence of free acid, trapped within the microstructure of the solid; (2) photo-chemical instability; and (3) thermal instability. These shrink to negligible proportions in a properly prepared product such as "Alloprene." Chlorinated rubber correctly prepared is stable up to 100 degrees C., and is not recommended for use in paints to be submitted to temperatures higher than that. Plasticizers require to be chosen with care, and Cereclor specially developed for this purpose meets most requirements.

Chlorinated rubber is notably flame resistant. At 230 to 300 degrees C., in the absence of oxygen, it merely chars with evolution of hydrochloric acid gas, which immediately smothers not only the chlorinated rubber, but also any surrounding conflagration. It is, therefore, of considerable value as a lacquer ingredient which at the same time is a fire extinguisher.

Chemical Resistance

Tests on the resistance of chlorinated rubber to hot and cold acids and alkalies have been carried out under paint conditions, i.e., on the material in film form. Negligible changes in weight or tensile strength have been observed after immersion in acids and alkalies of varying strength at 40 degrees C. and under for periods up to 168 hours. Tests in which solid chlorinated rubber was immersed for several weeks at 40 degrees C. in soda, hydrochloric acid, nitric and formic acids, both strong and dilute, confirmed the tests on films. A very high resistance to attack by gaseous chlorine, ammonia, sulphur dioxide and hydrogen fluoride was also found.

Chlorinated Rubber Plastics

Chlorinated rubber in the unplasticized state can be moulded thermo-plastically under a pressure of from 3-6 tons/sq. in., at 135 to 140 degrees C. Rigid temperature control is necessary, and the products are usually dark brown and semi-translucent. Moulding

A hank of Alloprene-Cereclor plastic.

Another modification of chlorinated rubber. An Alloprene-Seekay wax plastic.

temperature can be reduced by 15 degrees C. by addition of 5 to 10 per cent. of plasticizer. Opaque mouldings have been obtained by the use of fillers and pigments.

Chlorinated rubber mouldings compare favourably with other moulded insulating materials in regard to dielectric properties. A range of interesting plastics is prepared from Alloprene containing amounts of Cereclor and Seekay wax.

Thermo-plastic Moulding of Chlorinated Rubber

Simple flash moulds constructed of Staybrite steel may be used for the purpose, but have only a moderate life under these particular moulding conditions owing to the tendency to etch the surface of the mould. The low packing density of chlorinated rubber, even in powder form, necessitates refilling the mould before the maximum pressure is reached. Mould life can be increased by the addition of suitable plasticizers and Cereclor.

Plastic Masses from Chlorinated Rubber

Plasticized chlorinated rubber has a variety of uses in the massive form. Preparation is carried out by adding the powdered product to Cereclor I and/or Seekay wax, at a temperature of 90 to 100 degrees C., in a steam-heated mixer of the Werner Pfleiderer type. In view of the wide miscibility of chlorinated rubber with many materials, the number of plastics preparable in this way is very great. Their resistance to corrosive chemicals is comparable to that of chlorinated rubber itself. Moreover, the properties of all these plastics may be further modified by the addition of fillers, such as cork dust, kieselguhr, wood meal, asbestos fibre, chalk, mica, slate dust, silica, etc.

Uses

These plastics have been suggested for the hot lining of wood and metal vessels used for the storage and transport of chemicals, using plastics consisting of approximately equal parts of Alloprene (I.C.I. chlorinated rubber), Cereclor I and Seekay wax (I.C.I. chlorinated naphthalene), together with basic fillers.

They may also be used for incorporating with unvulcanized rubber, to give elastic translucent masses of improved flame and chemical resistance.

They have also been used for coating fuse wires, for impregnating and sealing electric condensers, and for coating high-tension insulators to cut down arcing; also as a sealing material for metal, wood or fibre containers, for the cementing of leather in footwear repair, and the stopping of cracks in woodwork and in plaster walls.

Linoleum produced from chlorinated rubber is attractive in appearance, and has excellent mechanical properties in addition to superior flame and chemical resistance.

The use of such a covering is, therefore, recommended in theatres, ships, hotels, etc.

Alloprene Porous Blocks

The product is also now obtainable in the form of porous blocks, so as to overcome any tendency of the loosely packed fibrous form to settle down. The insulating properties of such blocks are superior to those of cork block and the material is also lighter. As a heat insulator it cannot be used at temperatures above 100. It is suitable for the insulation of refrigerators of all types, and it absorbs minimum amounts of water even in highly humid atmospheres.

PLASTICS VERSUS CARDBOARD

A significant development in the future of amino plastics was foreshadowed by Mr. K. M. Chance, of British Industrial Plastics, at the ordinary general meeting of the company on November 24. He said that hitherto the plastic container had almost invariably been used in place of a tin box, but recently his firm had received orders for boxes moulded from Scarab or Beetle to be used for purposes for which cardboard boxes were formerly used. This new field for plastics opens up a great new market for amino moulding powders and one which, although highly competitive, will no doubt assume considerable proportions in the near future.

Inquiries and Answers

Water and Steam Proof Mouldings

We have been asked our opinion as to whether a moulded radiator cap would stand up to the continual contact of water and steam without eventual breakdown; the query relates to the non-inclusion of the metal liner which is usually placed inside the cap to prevent contact between the synthetic resin and the water.

It would be extremely difficult to estimate the life of, say, a phenol resin under such conditions, and the only satisfactory method would be to carry out a really practical test for some months. The water absorption of ordinary resin mouldings is low and special moulding powders are available which give still better results, but continual presence of vapour and steam, and under the worst conditions steam under pressure, are added complications. Whether or no a moulded cap would stand up to four or five years' continual wear is not easy to prophesy.

One special moulding material now on the market is stated to give a water absorption as low as 0.3 per cent. to 0.8 per cent. (24 hours total immersion).

Practically no work, so far as we know, has been done on the inclusion in powders of special water-resistant materials to give a "perfectly" water-resistant moulding, generally because, we suppose, most substances of this type decompose at the temperature of moulding. The inquirer might find a solution in the use of the "arochlors" now sold in this country by Monsanto Chemical Works, Ltd. The more viscous types do not decompose at high temperatures, are extremely water resistant and tenacious. A 5—10 per cent. addition to a powder would not increase very noticeably the price of the finished goods. Or again, the arochlor might be used as the mould lubricant instead of stearic acid. Under these conditions it is reasonable to suppose that some would penetrate the surface to a depth sufficient to afford improved protection.

The Brabender Tester

Halifax.

To the Editor, *Plastics*.

Sir,—In the November issue of your magazine on page 237, under the heading of "New Materials, New Plant, New Methods," you illustrate a Brabender Tester. We should be obliged if you would give us the name of the manufacturers. C.H., LTD.

[EDITOR'S NOTE.—The machine is manufactured by Brabender Electromaschinen G.m.b.H., Duisberg-am-Rhein, Germany. Their representative in this country is Dr. Ervin Simons, c/o Mr. Stork, 172. Upper Thames Street, London, E.C.4.]

Luminous Plastics

London, S.W.1.

To the Editor, *Plastics*.

Sir,—It was with great interest that I read your explanations about luminous plastics, following an inquiry by one of your readers. I should like to point out that there exists a German luminous paint which stands temperatures up to 1,000 degrees C. and probably more, so that it is already used extensively in connection with fire enamelling for military and naval purposes, as well as in connection with anti-air raid protection, propaganda, decoration and other purposes. So far as I know, this German luminous powder gives much stronger light effects than the well-known French and American products. Very extensive scientific investigations in Germany have shown that it can be exposed to any known conditions in the free atmosphere for many years without deterioration. There

is, therefore, no doubt that this luminous powder lends itself particularly well to application in connection with plastics. To give you a rough idea, I send you enclosed two photographs of a showroom in Germany, one of which was taken in the daylight and the other one at night. Most of the articles shown are enamelled; others, however, are printed, painted and sprayed. The religious figures are, I think, in plastics. K.W.

Poison-gas Decontamination

While chatting recently to the representative of a bitumen floor-construction company we were informed that there was a very important problem that remains unsolved, namely, the problem of preventing the contamination of floors of decontaminating stations. Mustard gas, the arch-criminal, is dreadful stuff to handle and if it soaks into odd corners and flooring is

most difficult, if not impossible, to remove. Bitumen and concrete readily absorb it, and so does rubber. What is wanted is a flooring layer quite impervious to mustard gas, which, of course, when in the condensed or ordinary condition is not a gas but an oily compound.

The representative informed us that not only his company but also the Government authorities were most anxious to find a solution, and asked us if the plastics world could help.

This is obviously an extremely difficult problem, and to get perfect results we should say almost insolvable. What is required is a perfectly jointless flooring made of a material that will not be affected by a liquid that dissolves most organic compositions. Existing stone floors, even the best terrazzo, would be useless, as the liquid, even in tiny amounts, would be absorbed in the cracks and remain therein for very long periods.

Since synthetic rubber is more resistant to oils than natural rubber, a seamless layer might give some advantage. Or, once having got this surface, yet another—a synthetic-resin lacquer surface might be evenly sprayed on—in the event of a synthetic resin unattacked by mustard gas being found.

It seems more probable that a simpler solution will be found—such as the maintaining of a constant layer of liquid which will prevent the mustard gas "wetting" the solid floor. Perhaps a layer ¼ in. to ½ in. thick of strong brine solution would not only keep any particles of the mustard-gas liquid floating on the surface, but would also prevent the chance of an emulsion being formed. If this were so, washing-down methods would be considerably simplified.

The maintenance of a water layer on factory floors is not a rarity, nor a great inconvenience. This method is employed in litharge and other lead works and in accumulator factories.

If contamination stations are to be built as permanent constructions, it seems that some such method—a synthetic-rubber flooring layer carried up the "coved" walls some short distance on which is maintained a layer of water or brine—may help.

Suggestions from readers will be gladly passed on to the proper quarters.

Soya Bean Plastics

88, Regent Street,
London, W.1.

To the Editor, *Plastics*.

Sir,—A Press cutting on Soya Bean Plastics from *Plastics* November issue has just reached this office, and as you state that you do not know much about the subject it occurred to me that the enclosed leaflet might be of interest to you. The article informs us that one farmer in the country is actively engaged in testing out its suitability for growth here, whereas, as a matter of fact, practically every county in England made trials with soya bean from 1934 seed supplied by Fordson Estates, who deal with it as a field crop. It is also a fact that Ford, of America, is definitely making and using plastic parts for motorcars, and has been doing so for some time. There is a selection of car parts in this office made of soya plastic, including gear-shift knobs, steering wheels, lighting equipment, horn press-buttons, etc., moulded from Soya Bean Moulding Compound using Soya Bean Meal. They were sent to us from America about three years ago. Information has reached us that cars completely fitted with soya plastic parts are even now on trial. There is a great deal more to the soya bean than a marvellous sauce and a raw material for making special foods! Actually, I have studied the subject closely for the past six years and am the author of the only book yet published in the country dealing with the cultivation of the soya bean and its uses.

E. C. Bowdidge.
(Fordson Estates, Ltd.)

[Editor's Note.—We quite agree that there is a lot in the soya bean, but within the pages of this journal we are not interested in its applications outside the industry, except in so far as it becomes of economic value to consider them. We are fairly conversant with the attempts that have been made to employ soya bean in the U.S.A., Japan, France and elsewhere for plastics, but the literature is very reticent as to the manner of employing it and of the properties of the finished goods. In almost all cases it has been employed in conjunction with phenol and formaldehyde or with urea and phenol and formaldehyde. Of the proportion used in such combinations, nothing has been divulged.

The reasons for using it are sufficiently sound if good materials result. It is a cheap raw material, for there is much more of the protein in the bean than there is in milk. Furthermore, according to many authorities, it is an extremely profitable crop to grow, and one of national importance from the food point of view. Consequently, even if the Ford Co. use only a small quantity, say, 5 per cent., in a resin mixture, and since obviously the products are sufficiently good for his purpose, then Mr. Ford's scheme is a sound, economic one and may have important repercussions on the world of plastics. We are anxious, however, to obtain some data regarding physical properties compared with ordinary moulded material made without soya bean.

As for plastics made from pure soya-bean protein, we have even less information. Since it is not employed by the large manufacturers of casein plastics in this country, there is presumably some difficulty regarding its use. Those interested in the general subject of the soya bean should note that Mr. Bowdidge is the author of the book "The Soya Bean, its History, Cultivation (in England) and Uses," published by the Oxford University Press. Another valuable book is that by G. D. Gray, "All About the Soya Bean," published by John Bale, Sons and Danielsson, Ltd., London, W.1.]

MODERN RUBBER CHEMISTRY

Dr. Harry Barron has written a book with the above title, a subject which deals with one of the most fascinating of human scientific endeavours.

Rubber chemistry is a most difficult branch of the science, yet let us congratulate Dr. Barron for producing that rare type of scientific treatise—a very readable one, written in language that can be easily understood by the average reader. It is a considerable achievement, yet rather to be expected from an author who writes intelligent notes on science for such papers as *The Evening Standard*.

The book contains a vast quantity of information essential to the producers of the raw material and to the fabricators of finished goods from it—on raw rubber, on latex, on reclaimed rubber and on synthetic rubber.

A very worthy effort! Price 18s. Published by Hutchinson's, Paternoster House, London, E.C.4.

TRADE AND PERSONAL NOTES

Department of Overseas Trade

The Department of Overseas Trade announces that His Majesty's Government in the United Kingdom have decided, after careful consideration, that it is not possible for them to accept the French Government's invitation to continue the United Kingdom's participation when the Paris International Exhibition is reopened for a further period in 1938. The French Government have been informed accordingly.

Synthetic Shellac in U.S.S.R.

Mr. A. J. Gibson (Special Officer, Lac Inquiry), contradicts the report published in a recent issue of Soviet Russia's publication, *Monthly Review*, that synthetic shellac is now being produced in the U.S.S.R. Apparently the report is premature, as so far only laboratory experiments have been carried out in Russia on the synthesis of shellac.

Shellac Statistics

Figures of the Calcutta shipments of shellac for the 10 months to the end of October amounted to 112,250 cwt. to the United Kingdom, 162,772 cwt. to the U.S.A., and 156,236 cwt. to Continental and other ports. Total exports amounted to 431,258 cwt. against 336,600 cwt. for 1936 and 261,792 cwt. for 1935.

America's Exports of Plastics.

Figures from the Commerce Department's Chemical Division, U.S.A., show that the exports of plastic materials for use abroad amounted to 9,500,000 lb., valued at $3,413,000, in the first half of the current year, against 6,245,000 lb., valued at $2,248,000 in the corresponding months of 1936, a gain of more than 50 per cent. both in quantity and in value.

Catalin's First Colour Film.

Warner Brothers have just completed a full colour motion picture of the production of Catalin at the Catalin Corporation's works in The Fords, N.J. The film is entitled "The Plastic Age" and is to be shown in more than 8,000 theatres in the U.S.A. and Canada, as well as 5,000 abroad.

Organic Glass, Ltd.

Capital £100 in 100 ordinary shares of £1 each. Objects: The company has been formed to carry on the business of manufacturers of synthetic resins, resinous moulding powders, varnishes and coatings, transparent resins, resinous, cellulosic or composite glass substitutes, safety or laminated glass, etc. Registered office: Royal London House, 12, Finsbury Square, E.C.2.

British Industrial Plastics.

The report of British Industrial Plastics for the year to June 30 last shows the profit on trading to be £25,000 higher at £105,568, with liberal appropriation for research, depreciation, obsolescence, etc., leaving net profit at £31,097, compared with £27,456 for the previous year. As already announced, the dividend is maintained at 8 per cent, £1,669 transferred to reserve and £4,172 (against £2,807) carried forward. The directors propose an increase of capital to £600,000 by the creation of 1,500,000 additional ordinary shares of 2s. each. It is their intention to approach the holders of the preference shares with a view to their exchanging them for ordinary shares in the company on some basis to be agreed so that the capital may consist of shares of one denomination only. There are 148,200 preference shares of 2s. each entitled to a cumulative dividend of 10 per cent. The 2s. ordinary shares are quoted about 2s. 9d.

Erinoid Capital Change

An extraordinary general meeting of Erinoid was held on November 25 to consider resolutions to amend the articles of association and convert the shares into stock. The 1,100,000 Ordinary shares of 5s. are to be converted into Ordinary stock, transferable in amounts of 5s., and the 55,000 Redeemable 6 per cent. Cumulative Preference shares of £1 into Preference stock, transferable in amounts of £1.

British Celanese, Ltd.

The 18th annual general meeting of British Celanese, Ltd., was held on November 10. Dr. Henry Drefus, chairman and joint managing director, presided, and stated that the trading account for the year showed a balance of £2,195,760, being a decrease of £110,347 as compared with the previous year. The tax-free profit for the year amounted to £247,078, as compared with £364,508, a decrease of £117,430.

Extensions to Moulded Insulation Works at Witton

Considerable extensions have just been completed in regard to the moulded insulation works of the General Electric Co., Ltd., at Witton, Birmingham.

The history of these moulded insulation works has been one of continual expansion. From being little more than a small shed housing a few mixing machines and presses, and employing a handful of people, it has grown, within the span of 20 years, into the largest plastics moulding works in the country, providing work for over 1,000 employees, and manufacturing a wide range of moulded products, including lampholders, switches, adapters, plugs and—more recently—bakelite fires and heaters.

Towards the end of this year the largest extension, a new two-storey building, was completed, adding a total floor area of 40,000 sq. ft. to the existing works. The new building is modern in all respects. The large window area allows the entry of the maximum amount of light. The ground floor is employed for finishing processes to the many moulded products manufactured in the existing works, and includes packing and despatch departments, while on the second floor is a metal insert stores and assembly department, and a works canteen capable of seating four hundred people for meals at one sitting.

NEW MATERIALS—NEW PLANT—NEW METHODS

Needle Shellac

A new form of shellac has recently been put upon the market; it will undoubtedly fill a want that has long been felt in many industries that employ this material for varnishes, records, in metal covering, felt-hat manufacture and for impregnating purposes. Hitherto shellac has only been produced in hanks, flakes, or powder form and because of the method of manufacture has had certain drawbacks. For example, in hanks, shellac retains about 25 per cent. moisture, while the powder and flake form retain about 5 per cent. moisture, a state which leads to deterioration on storing.

The new form takes that of needle shellac. It is manufactured in Belgium by a new patented process which may be described as spinning from the molten or dissolved shellac. Long, thin threads are thus obtained in a highly pure condition, containing very little moisture. The following advantages are claimed for needle shellac:—

(1) It is a pure shellac containing no adulterations.

(2) It can be stored indefinitely without risk of deterioration.

(3) Blocking or coagulation does not occur.

(4) In the needle form it is much more easy to dissolve than any other form, and concentrated solutions are rapidly obtained.

(5) The moisture content is guaranteed to be below 2 per cent.

(6) Drying and grinding of hank shellac is eliminated.

Two forms of needle shellac and, in background, hank type.

The sole selling agent for the British Empire is M. Hamburger, Dunster House, Mincing Lane, London, E.C.

Thiokol Moulding Powders

We have received from Thiokol, Ltd., of New Jersey, U.S.A., a sample of Thiokol moulding powder and a small rubber-like ball made from it. We believe Thiokol is the only synthetic rubber-like material from which a moulding powder can be made. It can be manufactured into soft and hard rubber-like compounds without the necessity of investing in expensive rubber machinery.

The Thiokol Corporation manufactures several types of moulding powders. The 400 Series when moulded under heat and pressure, gives elastic rubber-like products. Seven hundred Series yields hard non-brittle products similar to hard rubber.

In general, "Thiokol" moulding powders are:—

(1) Oil and gasoline proof.

(2) Extremely resistant to a wide range of solvents, refrigerants, acids and alkalies.

(3) Low in water absorption.

(4) Unaffected by sunlight, ozone and ultra-violet light.

(5) Moulded surfaces have a high permanent gloss.

(6) Very impermeable to fixed gases such as hydrogen, helium, natural and artificial illuminating gases and solvent vapours.

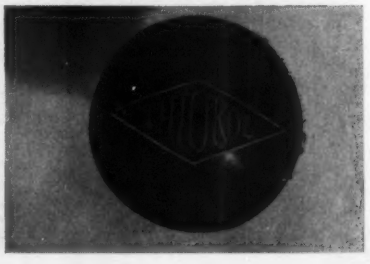
(7) Thermoplastic. All trim or rejects can be reground and used.

Moulds. Moulds such as are used for other plastic moulding powders are suitable for "Thiokol" moulding powders. The bulk factor for these powders is approximately 2.75 to 1, i.e., the volume of powder is 2.75 times the volume of the finished article. In designing moulds, ample space should be allowed to accommodate the powders. It is better to have the cavity too large than too small.

Temperature. The moulding temperature varies from 250 degrees to 300 degrees F., depending on the powder used and the size and shape of the moulded object. The function of the heat is to render the powder plastic so that it can be formed into the desired shape. The powder should, therefore, be heated to a point where it is plastic throughout. Heating to too high a temperature may lead to a blemished surface from air marks. If the piece is moulded at too low a temperature, a wavy, uneven surface will result.

Pressures. The pressure required to mould a properly heated powder is approximaately 700 lb. per sq. in.

Time. The minimum time required to heat the powder to the proper temperature throughout and flow it together is sufficient.



Schrader Hydraulic Pressure Gauge.

Largely with the object of providing an hydraulic pressure gauge which will overcome some of the disadvantage of the conventional dial gauge employing the Bourdon tube principle, Schrader's, of Birmingham, whose name is a household word in the automobile industry as the manufacturers of tyre valves and tyre pressure gauges, have evolved a series of hydraulic gauges operating on the direct-acting principle of the tyre gauge. This type of gauge is better able to withstand the high and rapidly changing loads imposed by hydraulic machinery, can be made to give more positive readings than the conventional dial gauge, is easier to read, and is far less liable to accidental damage. Compared with a dial gauge, the Schrader instrument has an almost entire absence of kick.

At the present time Schrader direct-acting hydraulic pressure gauges are being manufactured in a number of pressure ranges, the high ranges including 200 to 1,200, 300 to 1,800, 500-3,000, 1,500-5,000 lb./sq. in.

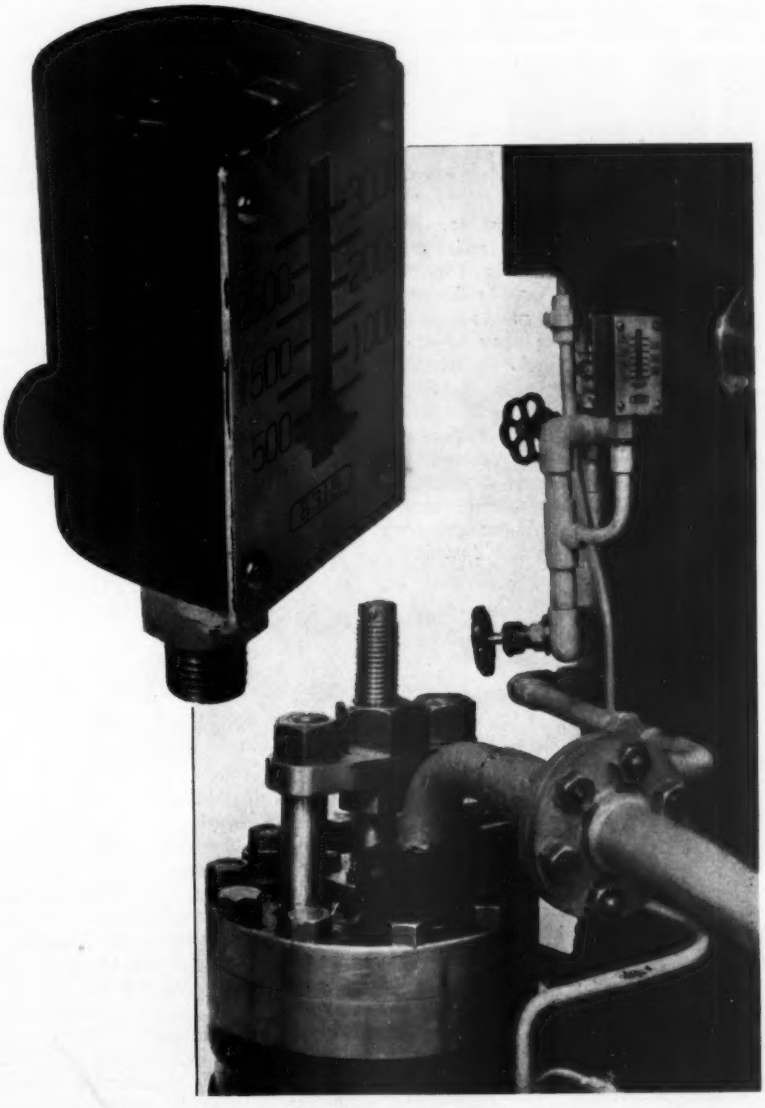
The simplicity of the construction of the direct-acting gauge lends itself to the achievement of a very fine degree of accuracy both in manufacture and pressure registration, while the few working parts can be made robust enough to withstand frequent overloading without failing.

Although the parts which comprise the actual pressure indicating mechanism of the gauge are not subject to severe operating or pressure shocks, they are robustly made and do not require to be protected by a glass or other transparent face which may become discoloured or cracked, thus making accurate reading impossible.

The gauges are designed so that they may be fitted as replacements to dial gauges without alteration to the unions and couplings.

Originally the Schrader direct-acting gauge was produced in response to a demand for a gauge of this type from a prominent manufacturer of gear-cutting machines in 1936. The result was so successful that the scheme was developed and to-day the direct-acting gauge has taken the place of the dial needle gauge in hydraulic machinery of many different types.

Inquiries should be addressed to Messrs. A. Schrader's Son, Division of Scovill Manufacturing Co., 829, Tyburn Road, Erdington, Birmingham.



A photograph of the Schrader Hydraulic Gauge fitted to a Carter Patent Hydraulic Die Cushion. This is a particularly severe test for the gauge, as the load builds from nothing up to 1,500 lb. per inch instantaneously. It is then maintained for a period of under half a second and falls again to nothing. This takes place about 50 times per minute.

Business Development and Plastics.

The first of a series of Business Developments Bulletins has just been published by the well-known practitioners in advertising, Samson Clark and Co., Ltd., 57, Mortimer Street, London, W.1. The first of these is welcome enough for it deals with plastics in a manner so widely embracing that it will be read with interest by those both new and old to the industry.

Culled from obviously knowledgeable sources, the subject matter includes an historical survey of the materials of the industry and then proceeds to describe the main sections of the materials available and the various fields in which they are employed. Phenol and amino resins, cellulose compounds, "organic glass," and synthetic rubber, are dealt with very adequately. Statistics regarding production are included.

The concluding section, entitled "The Creation of a Product and a Market," should be read by all those who intend developing the sales side of the industry.

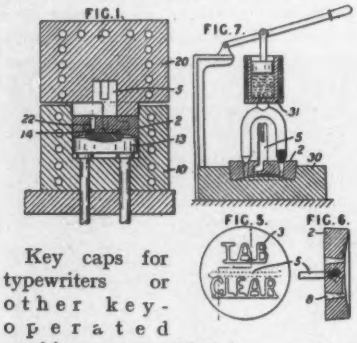
Expanded Rubber Co., Croydon.—Ship's lifebelts made of Onazote material have been officially approved by the Board of Trade for such duty. The Onazote lifebelt weighs under 5 lb. and will support three adults in the water. It is immune from insect attack and can be thrown much farther than heavier belts.

PATENTS RELATING TO PLASTICS

These abridgments of recently published specifications are specially compiled for this journal by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet, as issued, on payment of 5s. per group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address, price 1s. each.

467,419. Moulding Typewriter, etc., Keys.

EVANS, W. E. (Olympia Buromaschinenwerke Akt.-Ges.) December 13, 1935, No. 34696.



Key caps for typewriters or other key-operated machines are moulded from a plastic substance under heat and pressure into the form of a blank 2, Figs. 5 and 6, having bas-relief characters 3 in the top surface and channels extending from the bottom of the blank into the characters, and then filling the channels and the bas-relief portions with a substance 8 which hardens on cooling. The portion 2 is made by placing a resinous composition between the upper and lower heated members 20, 10, Fig. 1. The lower member carries an interchangeable ejector part 13 having the characters 14 in high relief, while the upper member has conical studs 22 for producing the channels, and carries a stem 5 for embedding in the key. The blank 2 is then transferred to a recess in a bed 30, Fig. 7, and acetyl cellulose from a heated cylinder 31 is forced into the channels and characters of the key cap. The filling hardens on cooling, and the material in the channels locks the characters in position.

468,435. Synthetic Rubber

BOSTON BLACKING CO., LTD. November 30, 1935.

Polymerized chloroprene is freed from malodorous impurities by exposing the material in rubbery condition and having a large surface compared with its mass, to the action of a selective solvent for the impurities. Suitable solvents are aliphatic monohydric alcohols, saturated and unsaturated aliphatic hydrocarbons, ethers, naphtha, and saturated cyclic hydrocarbons, but preferably an alcohol such as methyl, ethyl, propyl or butyl alcohols. In examples, the material sold under the Registered Trade Mark "Duprene" is (1) formed into a sheet $\frac{1}{32}$ of an inch thick and treated in a rotary drum with ethyl alcohol; (2) formed into a sheet $\frac{1}{4}$ in. thick and ground in a ball-mill together with solid carbon dioxide, the finely divided material being then allowed to reach room temperature and extracted with a solvent such as ethyl alcohol; (3) formed into a sheet $\frac{1}{32}$ in. thick, cut up into small pieces, and placed in a wire cage which is rotated in a drum containing ethyl alcohol; (4) milled on rolls and treated with ethyl alcohol; for instance, the material issuing from the rolls may pass into the alcohol and back to the rolls, or ethyl alcohol may be directed on to the material as it passes through the rolls, or the rolls may be submerged in ethyl alcohol. When the initial material contains a stabilizer such as a phenyl naphthylamine which is removed by the solvent treatment, this may be added subsequently. Where a solvent such as naphtha is used which swells the material, excess solvent may be removed for instance by pressing or centrifuging. Specification 387,363 is referred to.

468,681. Phenol-aldehyde Condensation Products

ROSENBLUM, I. November 4, 1935.

Fusible, oil-soluble phenol-aldehyde condensation products are prepared by condensing a homologue of phenol, with or without the addition of phenol, with formaldehyde in the presence of a terpene hydrocarbon such as dipentene and in the presence if desired of natural resins or esters thereof. An acid catalyst such as hydrochloric acid may be present.

467,434. Mouldable Abrasive Compositions; Resinous Condensation and Polymerization Products

CARBORUNDUM CO. December 16, 1935.

A mouldable mix for making abrasive articles comprises abrasive grains, powdered fusible resin and a plasticizer comprising an aqueous alkaline solution of normally solid resin or of resin which is plastic but not readily flowable. The plasticizer may be added as such or formed in situ, e.g., by wetting the grain with solvent and mixing it with a mixture of powdered fusible resin and soluble resin or by mixing the wetted grain with soluble resin and then adding powdered fusible resin.

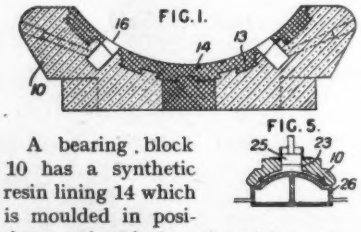
468,762. Vinyl Polymerization Products

NATIONAL CARBON CO., Inc. January 10, 1936.

Closures and closure protectors or seals are made of a thermoplastic resinous composition having a vinyl resin as a base which is in a state of internal strain so that upon application of heat, or other treatment such as the application of solvents or softeners, the strain is released and the shape is altered irreversibly whereby an intimate sealing is effected which can be destroyed only by deformation or destruction. Preferably, a vinyl resin is used resulting from the conjoint polymerization of vinyl halides and vinyl esters of organic acids.

468,219. Moulding Synthetic Resin.

BELL, G. December 31, 1935. No. 36034. [Class 87 (ii)] [Also in Group XXXIV]



A bearing block 10 has a synthetic resin lining 14 which is moulded in position on the block and which engages keying means on the block to prevent longitudinal and transverse movement thereof. As shown, the block 10 has dovetail recesses 13 for locking the lining in position, and is provided with longitudinal recesses 16 for the supply of lubricating and cooling medium. For the moulding operation the block 10, Fig. 5, may be positioned on a die 26 through which steam can be passed. The block has a recess 23 accommodating a plunger 25 which is forced inwardly to press the softened synthetic resin on to the block. In a modification the plunger 25 moves in a recess in the die 26.

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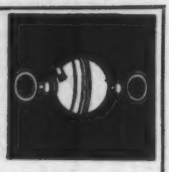

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